News of the Industry Begins Page 744

AUTOMOTIVE INDUSTRIES

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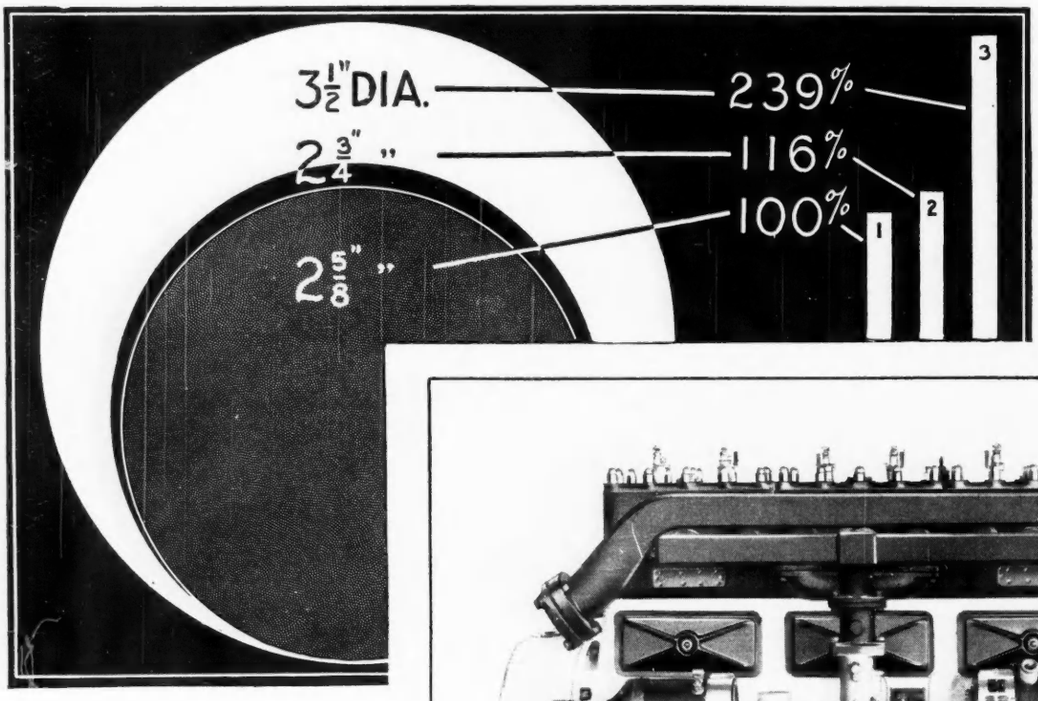
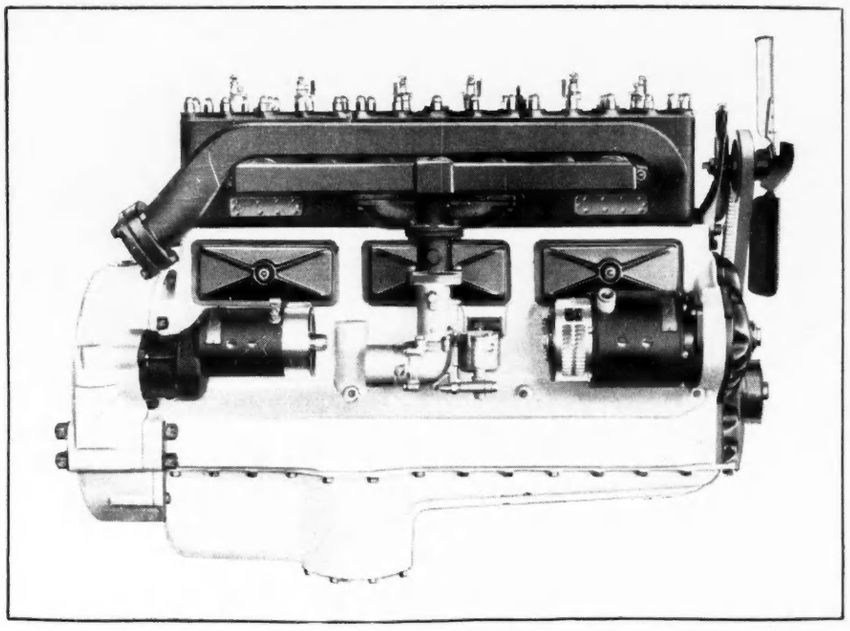


The above diagram shows crankshaft sizes of three well known big six engines, with diameters of 2⅝-in. and 2¾-in.—and Waukesha's crankshaft, 3½-in. White lines show their relative stiffness. If shaft No. 1 is considered 100% satisfactory, then shaft No. 2 has an excess strength of 16% and the Waukesha shaft No. 3 has 139% excess strength.



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Vol. 60 No. 19

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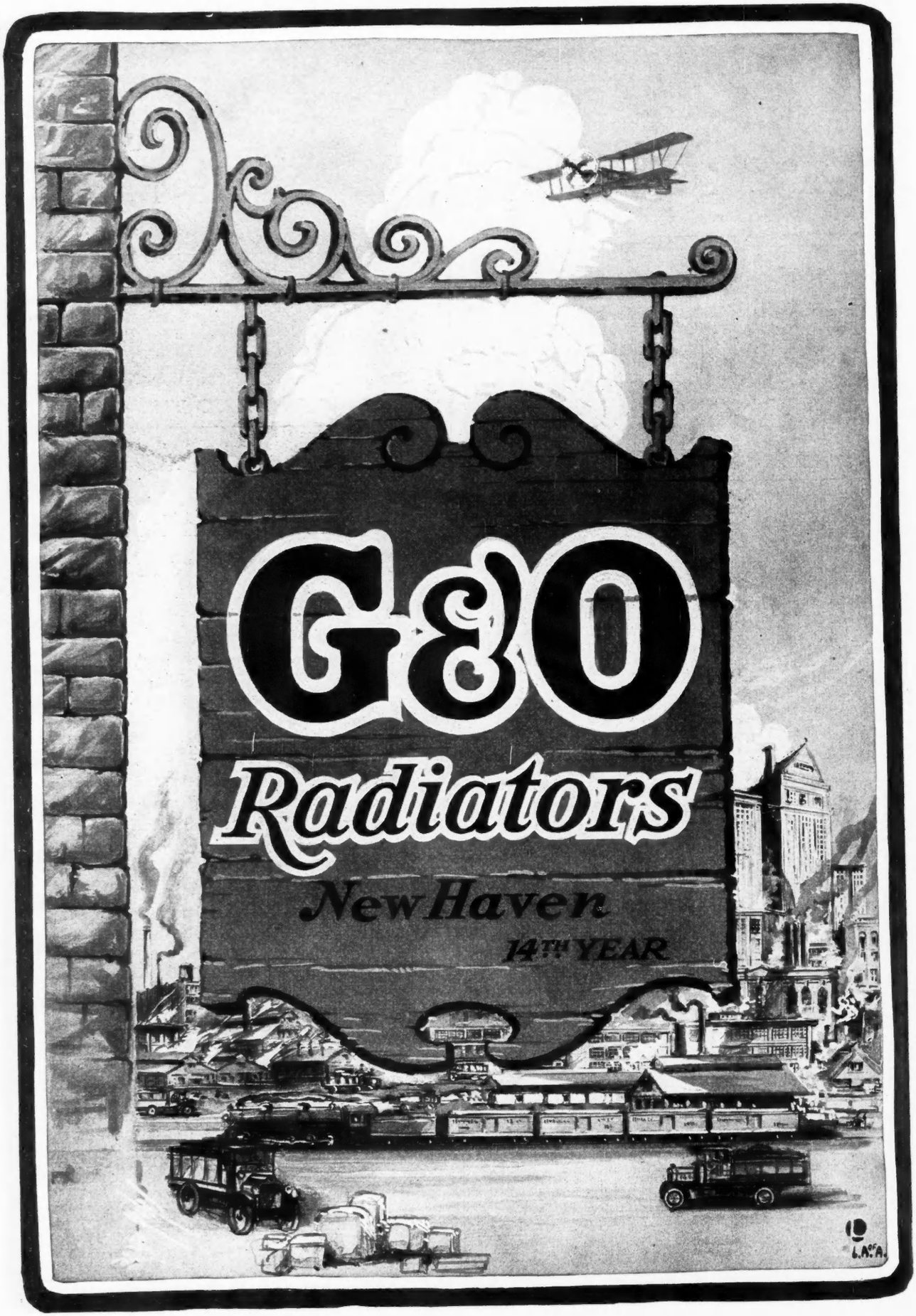
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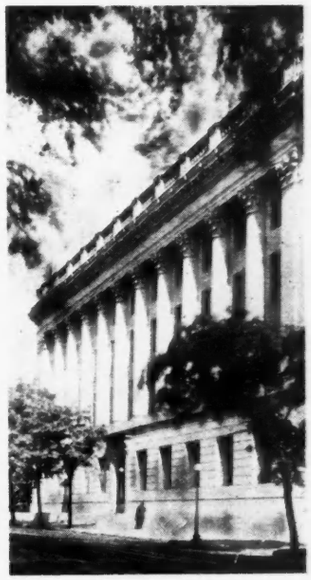
AUTOMOTIVE INDUSTRIES
VOLUME 60 *Philadelphia, Saturday, May 11, 1929* NUMBER 19

Change Animates Industry, Kettering Tells Chamber

Statically inclined organizations are doomed to failure, he says, pointing to research departments as sources that should produce the necessary new ideas.

By EARL O. EWAN



U. S. Chamber of Commerce Building, which faces the White House, Washington, D.C.

PARK-BENCH industrialists who seek to accommodate their intuitive desires for a respite from the insistent pressure of constantly changing manufacturing methods, facilities and appliances, are doomed to failure, in the estimation of C. F. Kettering, general director, General Motors Research Laboratories. He expressed this conviction in Washington last week at the closing session of the seventeenth annual meeting of the United States Chamber of Commerce, which he addressed on the subject "The Impress of Science on Business."

His comparison of such statically inclined individuals in their efforts to bore new holes for progress to "soft drills" that are turned, bent and thrown away in this era of diamond-pointed drills and carbide of tungsten cutting alloys, was considered one of the most sententious apothems of the five-day meeting. Utterance to that effect was made by John H. Fahey, publisher of the Worcester (Mass.) Post, and a past president of the Chamber, in a speech summing up the high spots of the assembly.

"We regard anything as scientific which we do not understand," said Mr. Kettering. "The reason there has been a conflict between science and industry is because of just that one point. When you are discussing science in business, however, you are discussing change and nothing else."

It is for bringing about needed changes that research departments are established, the speaker continued, further defining them as "the departments of new ideas." He advised that the executive analyze his business and submit to his research department for solution specific problems within the limited field of the personnel of that department. Scientists, he said, cannot be expected to step into a business world and successfully analyze its problems, but they can accomplish their solution when they definitely are placed before them. He emphasized in this connection the necessity for bringing about changes before they are demanded by the public so that time may be had for seasoning and fitting them into an organization.

A part of the duty of a research department, according to the speaker, is to take up the slack in employment and elsewhere caused by mass production by keeping the customer dissatisfied with what he has. Constant markets are thus maintained, and workers kept busy supplying the demand.

In the automotive industry, he said, the introduction of new models does not depreciate previous types in a strictly material sense, but it does through expressing in the new cars an appreciation of the public's mental idea of what it can have. The new vehicles appeal to the changed eyes that are seeing them, and for this change the public suffers in depreciation on former models for the satisfaction of its mental appreciation as represented by the new automobiles.

As an aid to constant change, Mr. Kettering suggested that every general manager should resign at the age of 50 years or slightly more, and become an instructor to the younger persons in an organization, who will be more inclined toward progress and seeing that the younger generations are given that to which developments entitle them.

How far this process of rapid change can be carried, or how long it will continue, Mr. Kettering said he could not possibly have any idea.

"We are just beginning to know how to measure and analyze," he asserted.

"We as yet know nothing about metallurgy and chemistry, and very little about anything else. The laboratory will bring new changes to affect industry, merchandising and distribution, providing we recognize it. Whatever the human mind can imagine, can be done, if it is economically sound."

An automotive atmosphere was lent to the annual dinner of the Chamber by the presence of several of the major executives of the industry composing the Contact Committee of the United States Chamber of Commerce. Prior to the dinner, they held brief conferences with President Hoover, Secretary of State Stimson, Secretary of Agriculture Hyde, Congressman Cassius C. Dowell, Chairman of the House Roads Committee, and Thomas H. MacDonald, Chief of the U. S. Bureau of Public Roads.

The party was headed by Roy D. Chapin, Chairman of the Board, Hudson Motor Co. Other members of the party were A. J. Brosseau, President, Mack Trucks, Inc.; Walter P. Chrysler, President, Chrysler Corp.; A. R. Erskine, President, The Studebaker Corp.; Edsel Ford, President, Ford Motor Co.; F. J. Haynes, President, Durant Motors, Inc.; Alvan Macauley, President, Packard Motor Car Co., and President, National Automobile Chamber of Commerce; C. W. Nash, President, Nash Motor Co.; H. H. Rice, Assistant to the President, General Motors Corp.; F. A. Seiberling, President, Seiberling Rubber Co., and President, Rubber Association of America; Alfred H. Swayne, Vice-President, General Motors Corp., and John N. Willys, President, Willys-Overland Co. The party was escorted by Alfred L. Reeves, General Manager of the National Automobile Chamber of Commerce, and Pyke Johnson, Washington representative of that body.

In discussing with the President and others means of expanding motor transportation facilities both here and abroad, the group suggested that there be created a National Transportation Board composed of representatives from existing agencies of the government which are interested in the several phases of the subject, "in order that studies of fact may be expedited in the interest of the traveling and shipping public."

C. F. Kettering, general director, General Motors Research Laboratories

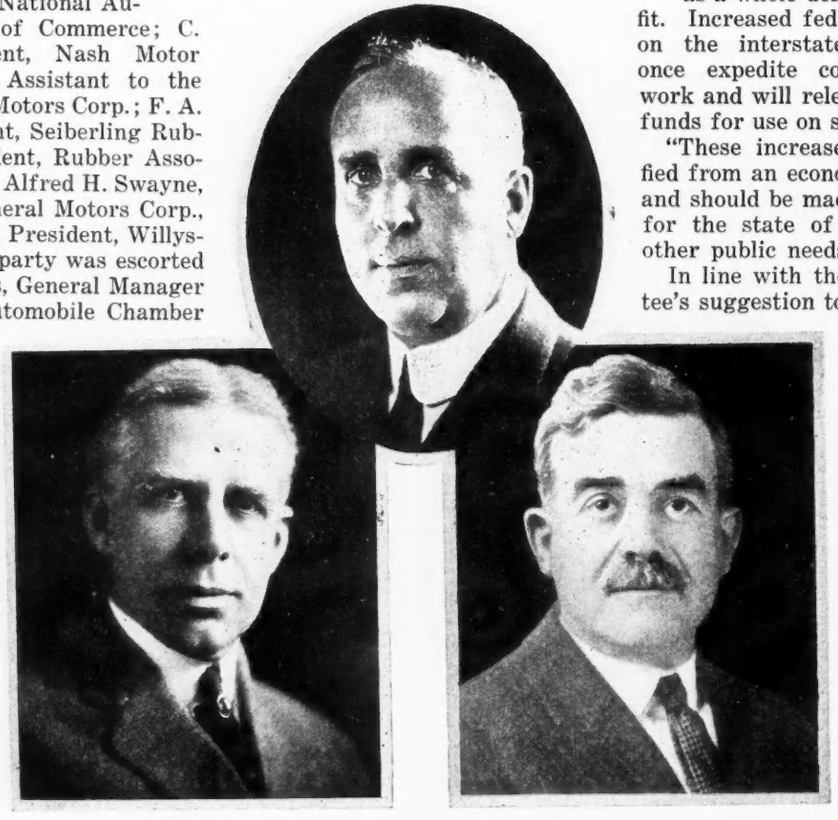
Relative to Federal highway aid, the Chamber adopted the following resolution on that subject sponsored by the National Automobile Chamber of Commerce:

"The constant expansion of motor transportation has brought with it new demands for highway construction and improvement despite the great progress made during the past decade. Because of this condition, state highway departments have found it necessary to expand the mileage of their systems at a time when traffic requirements on the main roads are reaching new peaks.

"Coincidentally, Federal cooperation in the improvement of main roads faces curtailment through the fact that reserve funds accumulated during the post-war period are now exhausted. Moreover, while two-thirds of the principal roads have undergone preliminary improvements, this work has been done very largely at the expense of the states, although the nation as a whole derives a direct benefit. Increased federal funds for use on the interstate system will at once expedite completion of this work and will release state and local funds for use on secondary roads.

"These increases are fully justified from an economic point of view, and should be made with due regard for the state of the treasury and other public needs."

In line with the Contact Committee's suggestion to President Hoover



In oval—Paul Litchfield, president, Goodyear Tire & Rubber Co., a newly elected director of the United States Chamber of Commerce. Left—Frederick Haynes, president, Durant Motors, Inc., a director, and A. J. Brosseau, president, Mack Trucks, Inc., re-elected vice-president of the chamber

relative to making government engineers available as consultants to other countries, the Chamber adopted a resolution on the subject "Highway Advisers to Latin-America," which read:

"The President of the United States has recommended to Congress that he should be given the same authority to name engineering advisers to American republics which may request their services as he may now exercise in appointing military and naval advisers. The appointment of highway advisers, who have had important participation in the construction of projects in the United States, will place at the disposal of Latin-American countries which have highway problems the benefits of the experience we now have in the United States by reason of the progress which has been made in the construction of improved roads, and we believe Congress should take prompt action."

Lammot duPont, chairman of the board, General Motors Corp., elected a director of the Chamber

A resolution on "Traffic Regulation" adopted by the Chamber incorporates the thought that was contained in one sponsored by the National Automobile Chamber of Commerce. The resolution that was adopted read:

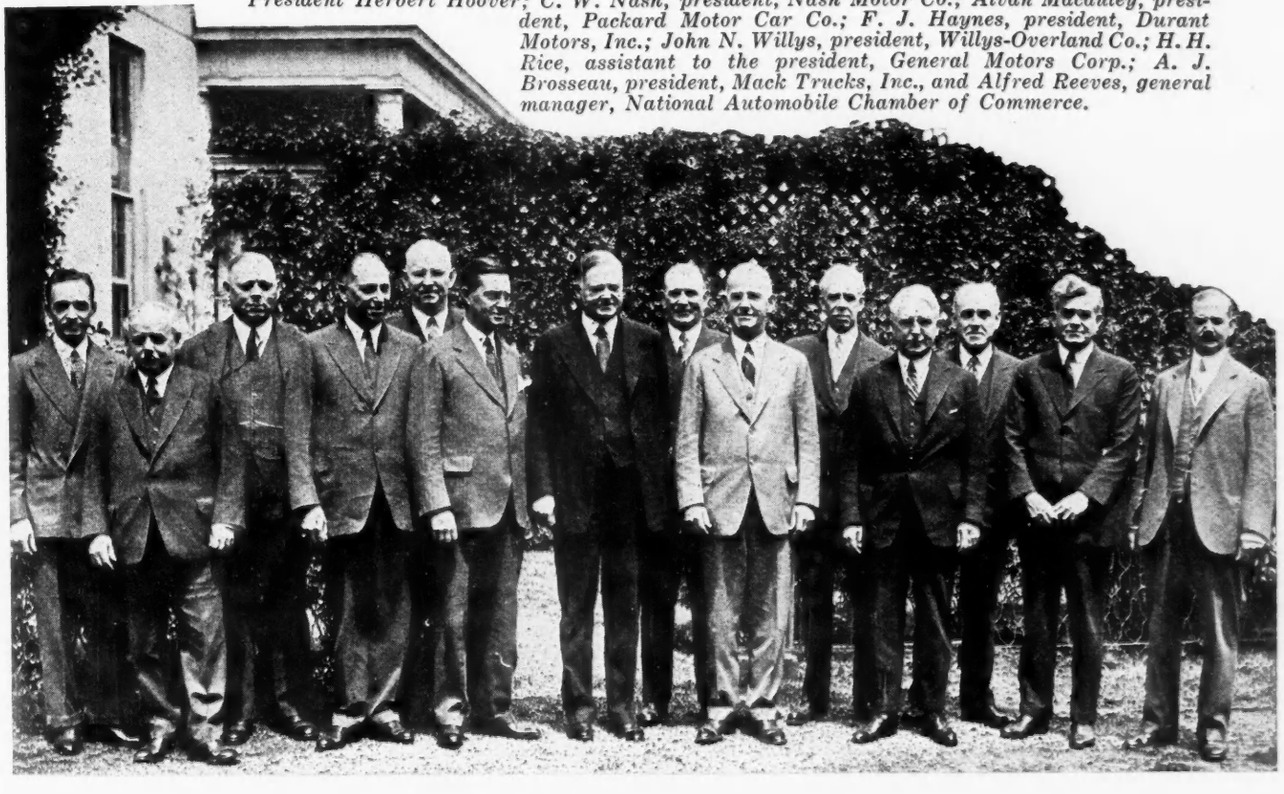
"The Chamber in 1927 endorsed the comprehensive program of principles developed by the National Conference on Street and Highway Safety, including the principle of uniformity in traffic laws exemplified in the Uniform Vehicle Code recommended by the Conference for adoption by states. In recognition of the need for carrying this principle of uniformity as far as practicable into the traffic regulations of cities and towns, there was developed last year for the Conference a Model Municipal Traffic Ordinance. This ordinance should be given careful consideration by all municipaiities, and incorporated in their local regulations to the fullest extent compatible with the conditions prevailing in those municipalities, to the end that the chaos now resulting from conflicting rules in different states and different communities within the states may be eliminated.

"In furtherance of the principle of uniformity, it is also urged that careful attention be given to the recent report of a committee of the American Engineering Council recommending standardized traffic signs, signals and pavement markings suitable for use in American cities and towns in harmony with the Model Municipal Traffic Ordinance and the Uniform Vehicle Code."

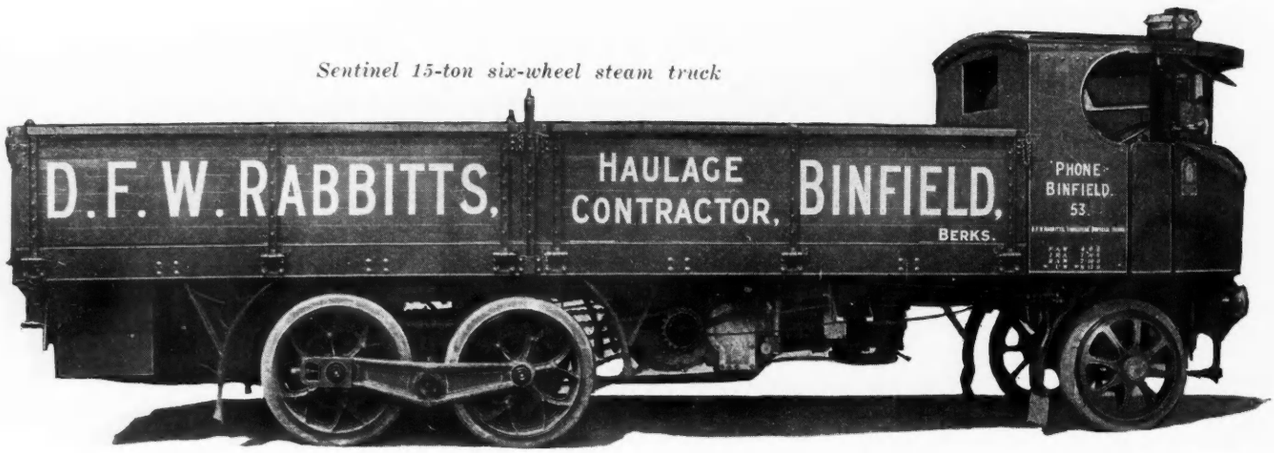
Speaking at the round-table conference on "Traffic of the City and Its Trade Area," Alfred L. Reeves, General Manager of the National Automobile Chamber of Commerce, outlined five things the Chamber of Commerce in any city may do to relieve the traffic situation. They were: (1.) Have installed progressive

(*Continued on page 726*)

Below is pictured the group of automobile executives that conferred with President Hoover including (left to right) Edsel Ford, president, Ford Motor Co.; F. A. Seiberling, president, Seiberling Rubber Co., and president, Rubber Association of America; Alfred H. Swayne, vice-president, General Motors Corp.; Walter P. Chrysler, president, Chrysler Corp.; A. R. Erskine, president, The Studebaker Corp.; Roy D. Chapin, chairman of the board, Hudson Motor Co., and chairman of the N.A.C.C. Contact Committee; President Herbert Hoover; C. W. Nash, president, Nash Motor Co.; Alvan Macauley, president, Packard Motor Car Co.; F. J. Haynes, president, Durant Motors, Inc.; John N. Willys, president, Willys-Overland Co.; H. H. Rice, assistant to the president, General Motors Corp.; A. J. Brosseau, president, Mack Trucks, Inc., and Alfred Reeves, general manager, National Automobile Chamber of Commerce.



Sentinel 15-ton six-wheel steam truck



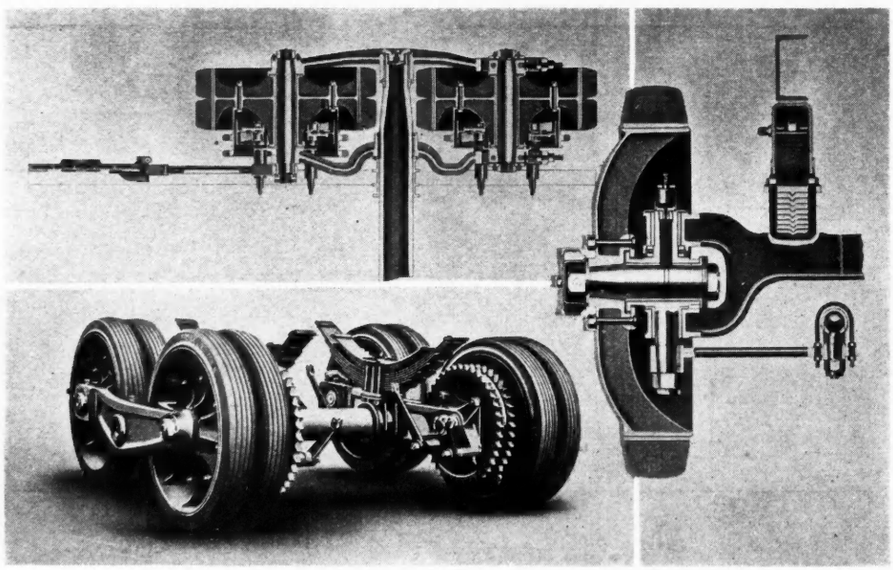
Sentinel Six-Wheel Steam Truck Unusual In Drive Design

Powerplant consists of a two-cylinder horizontal engine set underneath the frame and operated from a coal burning vertical boiler in front of the cab.

IN Europe, the tendency in truck design has been strongly toward the six-wheeler in recent years, and numerous new constructions of rear bodies, or four-wheel-drive units, have been worked out. We show herewith illustrations of the Sentinel six-wheel steam truck, manufactured by the Sentinel Wagon Works, Ltd., of Shrewsbury, England, which is of interest particularly because of the novel driving unit construction.

The Sentinel truck has a coal-burning vertical boiler in the front of the cab and a two-cylinder horizontal engine underneath the frame. The engine is combined with a two-speed reduction gear and differential. Each projecting end of the crankshaft is splined and carries a spur pinion which can be shifted axially to bring it into mesh with a corresponding spur gear on the differential countershaft. From the ends of the differential shaft, the power is transmitted by chains of 2 in. pitch to the forward pair of driving wheels, and each of these wheels is connected by another driving chain with the rear driving wheel on the same side. The chain drive was chosen because it was found that gear drives for these large vehicles come out excessively heavy. The truck is designed to carry a pay load of 15 long tons and weighs, unladen, 8 long tons. This ratio of pay load to vehicle weight is, of course, very creditable, and we are informed that it is achieved by the extensive use of aluminum and alloy steels.

From the sectional and other views shown herewith, it will be seen that the rear unit comprises a single, stationary tubular axle on which the chassis frame is



Above—Horizontal section through driving axle and driving wheels on one side

Below—Four-wheel driving unit of Sentinel truck

Vertical section through axle end, steering knuckle and front wheel

carried through the intermediary of the conventional half-elliptic springs, auxiliary springs or helper springs being mounted on top of the main springs. Each end of the main spring bears on a spring pad on the bottom of the frame side rail, and there are two additional spring pads on each side rail for the helper springs.

The tubular axle is tapered down in diameter at each end, and is fitted at each end with two balance levers with bearings thereon.

Each pair of swiveling levers carries at each end a stub axle or spindle on which one of the four driving wheels has its bearing. Thus the load is carried from the supporting axle to the wheels through the balance levers and applied to the wheels on both sides without overhang. As the balance levers are capable of swinging on the carrying axle, the load is always equally distributed between the wheels irrespective of road irregularities. Each of the four wheels may rise or drop 7 in. with respect to its normal level before this equal distribution of the load is disturbed.

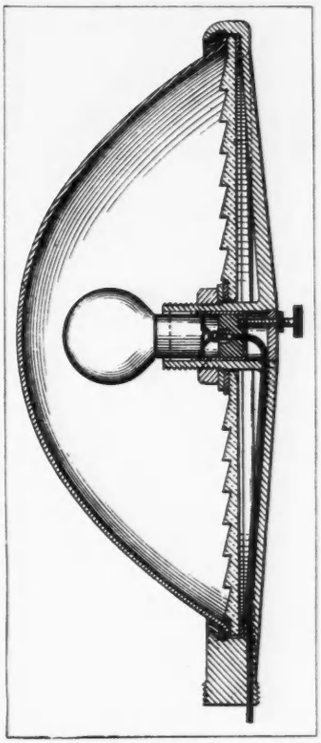
Balance Levers Rigid

The balancing levers are of comparatively light weight, having an I section, and their ends are firmly tied together by the stub axles on which the wheels run, which have taper fits on a boss on the levers and in a chain-adjusting block. This rigid connection of the ends of the balance levers gives great resistance to lateral shocks, which occur when one of the wheels hits the curb a glancing blow. Provisions are made on the balance levers to adjust the chains which connect the forward and rear driving wheels, and these adjustments can be made independently on either side. The chains which transmit the power from the differential shaft to the forward pair of wheels can be tensioned by means of adjustable radius rods connecting to the engine supporting brackets on the frame.

The front wheels on the Sentinel steam truck also are of rather unusual design. The steering knuckles are so arranged that the knuckle pivots come substantially over the center point of tire contact on the ground. This arrangement was adopted to obtain a nearly balanced steering system and reduce the buckling force on the tie rod to a minimum. As shown by the sectional view, each dished cast metal wheel is keyed to a spindle which has a plain bearing in the steering knuckle. A ball thrust bearing is used on the knuckle, which is said to reduce the steering effort required considerably. The knuckle is in the form of a cross, incorporating the knuckle pin, and the bearing in the yoked axle end is split.

New Heavy-Duty Headlamp

A PATENT was issued recently to Edmund B. Neil, Research Engineer of *Automotive Industries*, on which a number of claims have been granted that cover a type of lamp specially suited to heavy-duty service on motor trucks, buses, etc., and which in lighter form may be adapted to passenger car use.



Section of Neil's headlamp with front-mounted bulb

One of the essential features of the lamp, as outlined in the patent office claims, is the combination of the means of attaching the lamp to the vehicle and a front supporting member or ring, this in turn also holding the lamp bulb in a position reversing that ordinarily used. The reflector and shell covering it (if used), therefore, acts only as such, and has no hole for the bulb at its center or point of minimum focal length. While no claim is made covering the reversed position of the bulb alone, since this idea has been used in some lamps of European manufacture, the method of supporting it and the means of mounting the lamp as a whole are considered new. Several modifications of the idea are shown on the drawings accompanying the patent, one of which is presented here.

The design lends itself to the use of fixed-focus construction, since the supporting member can be cast or formed, and offers a rigid surface or edge for the rim of the reflector. The lens is inserted from the back of the lamp, as are also the bulb, reflector and retaining device. Any type of lens or bulb can be used, as the patent relates more to a method of construction and manufacture at low production cost than to any particular characteristics of illumination.

HEREWITH appears an architect's drawing of the new Oldsmobile Administration Building under construction in Lansing, Mich. It will have a frontage of 316 ft. and an average depth of 85 ft., will be four stories in height and contain 94,168 sq. ft. of floor space. A large auditorium and display room will open off the main lobby. The structure is scheduled to be completed about Dec. 1, 1929, according to I. J. Reuter, president and general manager of the Olds Motor Works

Trend in *Rubber Research* Efforts *Leads* to *Engineering* Problems

Methods of harvesting plants and manufacturing processes are to be considered in conjunction with Edison's attempts to discover emergency source of rubber.

By ISMAR GINSBERG

THE attention of the automobile industry has been called to the experiments which Thomas A. Edison, the electrical genius and inventor, has been carrying on in Florida to locate a source of rubber indigent to the United States. Comment on the commercial and industrial significance of these experiments does not concern the automotive industry as much as the technical exploitability and the general chemical aspects of the whole effort of extracting rubber from the juices of plants.

While this effort is by no means new with Edison, we must remark, in justice to him, that he is not concerned at all with finding a native source of rubber which can compete with the foreign product. He is merely trying to develop a process for treating a native grown plant which contains sufficient rubber to make it suitable for manufacture in an emergency. In times of war, for example, when supplies of rubber from external sources may be cut off, a completely perfected method placed on file would be available for prompt use. His work also has been concerned with the discovery of a plant which will give the most, the best and the least costly rubber. Although from the standpoint of the policy underlying the experiments his contention is—rightly enough—that when rubber is required in an emergency, it would make but little difference what it might cost.

The technical aspect of this problem is very interesting. It has both a mechanical or engineering, and a chemical side. The first problem is to find a plant, now wild, which grows in large quantities, and which can be suitably cultivated. Plants that grow wild cannot be easily harvested. Thus, we may mention a plant, which Edison has probably given his attention to and which has been studied before, namely, the Ocotillo plant, otherwise known as cactus rubber. It is found in Arizona and California in arid regions. A spineless variety of this plant, known as spinless cactus, developed by the eminent botanist Burbank, has been grown in southern California for cattle feeding purposes. It has not been successful, because the insoluble gum, the rubber contained in it, kills the animal.

To harvest this plant in the regions in which it grows is manifestly a very difficult undertaking. Such a plant to be useful at all would have to be cultivated in regions where there is reasonable opportunity for gathering it.

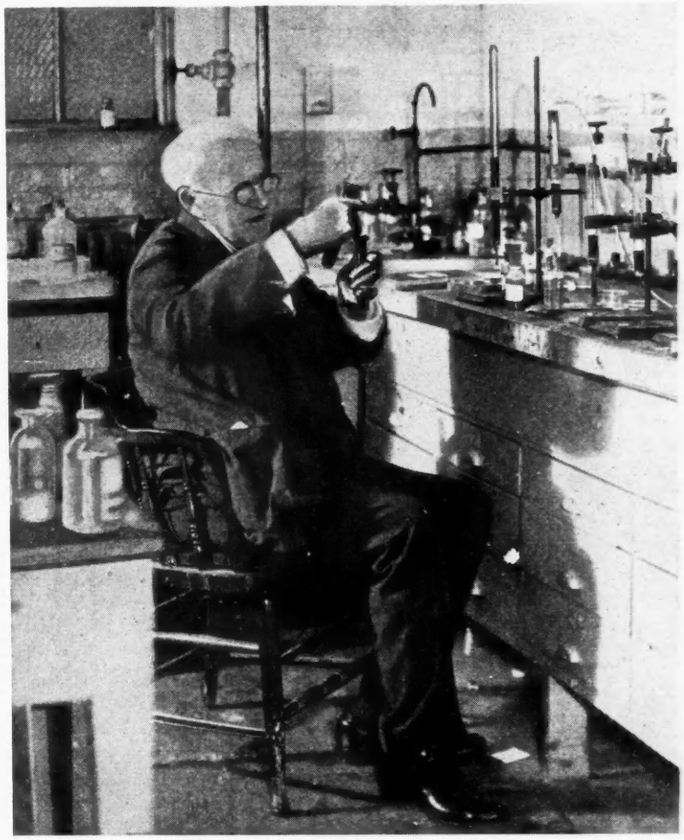
Another such plant is known as common green or Sierra rubber. It grows in great quantities in the western part of the country, but in such mountainous and rough country that it would be enormously difficult to harvest it. On the other hand, there are plants which also contain rubber and which grow under conditions which are not so severe and where the harvesting problem can be solved by proper organization. One of the most advantageous of these plants, from the standpoint of the rubber that it contains, is the common milkweed, and also the mangrove bush, to which Edison has been giving special attention. There may also be mentioned a plant known as Cryptostigia Grandiflora, which is found wild in large quantities in Florida. This plant is particularly interesting for the reason that it contains rubber in all its parts.

Before leaving the matter of harvesting the plant, it should be mentioned that the problem is difficult but not insurmountable. For many years past, paper men have had the idea of collecting the corn stalks that are disposed of as waste in enormous quantities every year and making them into paper. The conditions surrounding this problem are very similar to those pertaining to the rubber problem. The corn stalks contain only a comparatively small proportion of cellulose suitable for paper making, just like these rubber-containing plants yield but small amounts of rubber, necessitating the collection of a large amount of raw material for any appreciable production. Nevertheless, within very recent times, considerable progress has been made in the manufacture of paper from corn stalks. The undertaking has not yet attained commercial importance, but it has been shown that, with the right sort of organization, it is possible to collect so bulky a material as corn stalks, at the same time overcoming the deep-rooted practice of the farmer to get rid of it by burning the stacks. It may well be argued that what has been achieved in the case of corn stalks, under normal har-

vesting conditions, can be likewise accomplished in the case of rubber under the extraordinary conditions of a rubber shortage.

It has been mentioned that a large amount of these rubber-containing plants and weeds must be gathered to obtain any noteworthy production at all. The reason for this is the very small amount of rubber contained in the plant or in the juice that is obtained from it. For example, Asclepias Syriaca, the common milkweed, contains rubber in the form of a latex, literally milk. This milk will yield between 2 and 3 per cent of rubber. There are upward of 1000 species divided among 130 genera of the plants belonging to the general class of Apocynaceae, trees, shrubs and herbs—all containing latex. These plants yield from 1 to 2 per cent of rubber.

An interesting observation has been made in connection with these plants, substantiating the theory that the gum is formed by Nature in plants to enable them to retain their water content under climatic conditions preventing them from enjoying plentiful water supplies. Thus, the plants taken from dry, sandy soils were found to contain about 2.27 per cent of rubber, while those growing in wet soil and swamps contained only 1.12 per cent of rubber. The better quality of rubber was, moreover, obtained from the sandy soil. Cactus rubber is also obtained in very small yield from the Ocotillo plant. The Sierra rubber plant, Chrysothamnus, yields between 3 and 6 per cent of rubber, while Cryptostigia Grandiflora gives between 1 and 4 per cent rubber. In general the yield is about 2 to 3 per cent. This is very small as compared with the yield of rubber from the latex of Hevea Brasiliensis, the best known and most important of rubber trees.



Thomas A. Edison at work in his laboratory

Enormous quantities of such plants would have to be gathered in order to supply even a small fraction of the rubber demand. After collection, the rubber would have to be recovered in one way or another from the plant. This could be done in a number of different ways. A tree could of course be tapped, but a shrub or bush or weed must be subjected to a more or less involved process to recover the latex. The weeds and the like could be macerated with water between heavy rollers, which would crush the fibers and liberate the latex, much in the same manner that sugar syrup is recovered from the sugar cane. This method could be used only where the rubber is present in the form of latex.

Other methods, such as solvent extraction, would have to be used where the rubber is deposited as such in the plant. Where solvents are used, they would have to be recovered; otherwise the cost of the operation would really be excessive. The solvents that readily dissolve rubber, such as carbon disulphide, acetone and the like, are by no means cheap substances, and furthermore, there is always more or less of a fire and explosion risk when these solvents are employed. Still again, a solvent recovery plant is by no means the simplest kind of an installation to operate, and requires considerable skill and attention to details if good results are to be obtained. Another point that must be borne in mind when extracting the rubber by the solvent extraction process is that the solvent will dissolve other ingredients of the plant or the latex, and these will then contaminate the rubber unless they are removed. The process of removal again constitutes a solvent extraction operation with all its attendant difficulties and troubles.

It has also been suggested that destructive distillation might be used to recover the rubber from the plant, particularly in the case of cactus rubber. It is, however, hard to see just how effective such a procedure would be, and here again the operating conditions would be very hard to control so that a consistently constant product would be obtained. This is always a deterrent in the use of destructive distillation when it is applied to a product of complex nature.

The latex obtained from these plants, no matter what the process of recovery may be, is not the same product that is obtained from Hevea Brasiliensis. Ordinary rubber latex is a product which is processed easily and which yields a gum which can be cured readily. This is not the case with the latex obtained from weeds and the like. For example, in the case of the common milkweed, Asclepias Syriaca, while the latex is milk white and either neutral or acid in reaction, it does not coagulate on standing in a closed vessel and it is imperfectly coagulated by acids. A few drops of acetic acid is sufficient perfectly to coagulate Hevea latex. Milkweed latex is thickened or partly coagulated by ammonia, while ammonia is added to Hevea latex to prevent its coagulation. On the other hand, milkweed latex is coagulated by heating or by alcohol. It is understandable that when alcohol is used for this operation, the whey that remains after the gum has been separated should be distilled to recover the alcohol. This is again a difficult process, one requiring distillation equipment. It has been found that the milkweed coagulum can be molded into cakes which resemble cheaper grades of rubber, but that the rubber which is finally obtained from this coagulum on curing is flabby, lacks strength and firmness.

The same trouble of coagulating the latex is found in the milk obtained from the Apocynaceae plants, particularly Apocynum Cannatrium and Apocynum Androsaemifolium. A good grade of rubber can be ob-

tained from these plants, but with considerable difficulty. The latex, which is white, viscous, neutral or slightly acid, is not coagulated by acids, nor by alkalies. Boiling coagulates it slightly and slowly, but it is coagulated instantly and completely by acetone as well as phenol, and less readily by formaldehyde. These chemicals are expensive and in wide demand at the present time, and if they had to be used for this purpose, they would have to be recovered. Thus, to obtain a good grade of rubber, the coagulum has to be treated with solvents, filtered to remove dirt, evaporated at low heat, the excess solvent removed by distillation or the like, the rubber precipitated, the precipitate washed. Such a process is long, costly and laborious. The rubber yield is less than in the case of the milkweed but the quality is better.

To obtain rubber from the barberry shrub, it is necessary to extract the plant with water, according to Swedish Patent No. 42277, then to dry the product obtained, extract with benzine, ether, carbon disulphide or other solvent to remove the rubber, then to precipitate the rubber and dry it. This is again an involved process.

An entirely special treatment must be applied to the Ocotillo plant to obtain cactus rubber. Solvents must again be used. A good grade of rubber is, however, obtained, which resembles smoked sheet rubber or guayule in properties. It is claimed that this rubber can compete, as far as technical characteristics are concerned, with crude rubber and guayule.

Rubber is contained in the stems, seed pods and leaves of Cryptostigia Grandiflora. Here the rubber is recovered by first separating the bark from the wood, drying both in thin layers, the latex coagulating on heating.

In every case the rubber will contain large amounts of resin which is highly detrimental to its curing or vulcanization. While it has been found that a certain proportion of the natural resin must be present in the rubber in order for it to cure properly. Rubber with a large amount of resin present in it is very "short" and highly deficient in the qualities that characterize Hevea rubber. It, therefore, becomes necessary to remove these resins, which must involve solvent extraction if costs are to be kept down to reasonable limits. Even when cost is not a primary consideration, it would still be necessary to recover the solvent, for there would not be sufficient of these solvents available for this purpose, in view of the many other important uses to which they are put, to permit their use and disposal as waste.

The technical and chemical problems involved in the recovery of rubber from weeds and other plants other than the rubber tree are, therefore, clearly difficult ones to solve. They can be solved. There is no question of that, but their solution entails considerable study and experimentation. It is not that the operations are extraordinary in the chemical industry, but that the conditions under which they would be applied require special consideration.

Change Animates Industry

(Continued from page 721)

signal lights similar to those used in Chicago. (2.) Have overpasses constructed at the busiest intersections. (3.) Have adopted traffic laws in line with the Hoover Code. (4.) Have centralized responsibility in the city administration in the way of a traffic commissioner or director of traffic. (5.) Have a business men's committee to aid in making traffic regulations relative to parking.

A resolution on "Distribution Studies" was adopted by a large majority over opponents who said it would encourage that paternalistic interest of the government in industry against which Dr. Julius Klein, Assistant Secretary of Commerce, had warned in a speech before the Chamber. The resolution read:

"Congress should provide more adequate appropriations to permit the Division of Domestic Commerce of the Department of Commerce to undertake detailed cooperative distribution studies with those fields of industry which are interested."

A resolution proposed by the National Automobile Chamber of Commerce on the "Inter-American Highway" was referred to the Board of Directors of the United States Chamber "with a suggestion that it should be referred to the appropriate committee for consideration when the project becomes more definite."

A resolution introduced by The National Association of Finance Companies on "Automobile Liens" was referred to the Board of Directors of the Chamber without suggestions. The resolution proposed a declaration favoring amendment of the national automobile theft act for the purpose of making its penalties applicable to transportation in interstate commerce of motor vehicles on which there are unsatisfied purchase money liens without prior notice to the lien holder of the intention to transport interstate and of the destination to which the vehicle is to be taken.

At a meeting of the Board of Directors of the Chamber, following adjournment of the annual meeting, A. J. Brosseau, President of Mack Trucks, Inc., was reelected as vice-president of the organization. Previously, Lammot duPont, chairman of the board, General Motors Corp., had been chosen as a director for the second election district, comprised of the states of New York, New Jersey, Pennsylvania and Delaware, and Paul W. Litchfield, President, Goodyear Tire & Rubber Co., was selected as a director from the fifth election district, covering the states of Michigan, Indiana, Ohio and Kentucky. Frederick J. Haynes, President of the Durant Motor Car Co., is a director. His term will expire next year.

Ford Changes

SEVERAL changes in the design of Ford Model A cars have come to light recently. One is a change in the wheel design, which was evidently made to accommodate the wheel hub to the new style brake drum which provides for the placing of the service and emergency brake shoes side by side. The new wheel cannot be used together with the old-style brake drum nor can the old wheel be used together with the new drum.

The breather cap of the engine is now provided with heavier stops, so that it cannot be screwed down so far that the breathing action is impeded and pressure is allowed to build up in the crankcase. In order to effect ventilation of the clutch housing, two transverse louvres are cut in the cover of this housing. These two latter changes were made to reduce the chance of oil leakage from the crankcase into the clutch housing through the rear main bearing.

Rear axle drive pinions now are cut with nine instead of ten teeth, and this has very slightly changed the rear axle ratio (from 3 7/10 to 3 7/9). Owing to the adoption some time ago of double-filament headlights, a new lighting switch is now provided. The new breather, the new clutch housing cover and the new lighting switch can be installed on old cars. The web of the flywheel where it bolts to the crankshaft flange has been increased in thickness from 3/8 to 11/32 in., which necessitates the use of longer bolts.

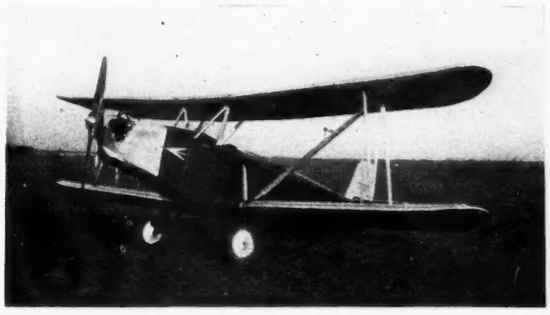
Light Two-Seater *Plane* Produced By *German* Aircraft *Engineers*

Machine is a biplane with a 35 hp. ABC Scorpion engine, and is the first ship of its size to be approved in Germany for stunting.

By EDWIN P. A. HEINZE

TWO German aircraft engineers who gained their experience with gliders or soaring planes, Messrs. Mertens and Meyer, have produced a new two-seater light plane known as the Phoenix Meteor L-2. It is the first machine of its size to be approved in Germany for stunting, and it is being built by the Phoenix Flugzeugbau of Duesseldorf-Lohausen. It is sold in its standard form with all necessary instruments for $1,500, while with other than the regular engine it sells at prices ranging up to $2,350.

The machine is a biplane with a 35 hp. ABC Scorpion engine, and weighs only 551 lb. It is capable of carrying a load of 463 lb., so its full flying weight is 1014 lb. It is constructed entirely of wood, with fabric covering for the greater part of the wings and fuselage.



Phoenix-Meteor light plane, front view

The wings, which have a span of 27.5 ft. and a chord of 3.28 ft. each, practically are rectangular in plan, with parallel leading and trailing edges, but well-rounded tips. They are staggered, the leading edge of the lower wing being directly below the longitudinal axis of the top wing. There is a single N-strut between the two aerofoils on each side. The upper wing has no lateral dihedral, while the lower one, which carries the unbalanced ailerons, has a pronounced dihedral angle.

Each wing consists of three parts, the middle section being firmly connected to the fuselage, while the end sections can be folded up close to the body, so the machine can be put up in any ordinary garage or shed. The middle section of the lower wing forms an integral part of the fuselage. The wings are built up of two spars and the usual ribs, the leading edge having a plywood covering extending to the first spar, the rest having a fabric covering. A novel feature is that wooden struts are employed instead of bracing wires inside the wings. Interplane wire bracing is also dispensed with, its place being taken by a long steel strut on each side leading from the N-strut connection on the upper wing down and inward to the hinged base of the lower wing. The total wing area is 172 sq. ft.

The fuselage, which has a total length of 20 ft. 4 in., affords ample room for two persons. Whereas in many planes of this class the front cockpit is very inaccessible, the reverse holds true in the case of this machine, the fuselage of which is covered with plywood extending from the front to the first cockpit, while the remainder is covered with fabric. The fuselage uprights are of special design, consisting each of four strips, which are joined by plywood gussets, giving them great strength in spite of their lightness.

The engine mount, consisting of a steel tube bracket, is easily detachable, and a fire-proof bulkhead separates the engine space from the interior of the fuselage. The oil tank is placed immediately behind the engine, while the fuel tank is located in the middle section of the upper wing in such a way that it may be easily removed from beneath. This section of the upper wing is supported above the fuselage by an N-strut at each side, while the stub ends of the lower wing are supported at each side by a single short strut. All struts and the engine cowling are, of course, duly streamlined. The landing gear is of the simple two-wheel type, with skid.

The machine can be supplied with any one of the four different engines. As already mentioned, the standard engine is the ABC Scorpion. The other, optional engines, are the 35 and 45 hp. Anzanis and the 40 hp. Salmson.

With a wing-loading of only 5.88 lb. p. sq. ft., the standard machine has a maximum speed of 80 m.p.h. and can attain an altitude of 1000 meters (3281 ft.) in 8 minutes. Its ceiling is 4000 meters (13,123 ft.). The engine power-to-weight ratio is 1 hp. to 28.9 lb. With full load, the machine has a landing speed of 31 m.p.h. and it requires a distance of 164 ft. to get off the ground on a calm day, and 114 ft. on a windy day. The fuel tank has a capacity of 13 gal., which gives the machine a radius of action of 373 miles. It is, of course, quite easy to install a larger tank, but this reduces the pay load correspondingly. The wings have a factor of safety of nine, based on the normal load on them.

Inspection Methods *In Aircraft* Plants *Require* High *Standards*

To meet conditions of proper design, correct material and dimensional accuracy, each step of production should be supervised by engineering department.

By GEORGE J. MEAD*
Vice-President, Pratt & Whitney Aircraft Corp.

QUALITY in aircraft powerplants is an obvious essential; it cannot be slighted to cheapen the product and only one standard can be maintained. This makes necessary an entirely different attitude toward quality and its enforcement than is found in any other industry.

The principal requirement of an aviation powerplant is reliability. To meet such a requirement involves proper design as well as correct material and dimensional accuracy. Under these circumstances the work of the engineering department is so closely connected with that of the inspection division that it is first of all desirable to consider the relation of design to quality.

Proper design and materials specifications facilitate inspection and thereby reduce its cost. Certain design features primarily affect the durability of the part. The form of each part is important as it affects the fabrication of the material in the rough and has considerable bearing on the uniformity of cast and forged pieces. Cylinder heads, for example, must be of such shape that gas pockets are not apt to form and thus cause porosity. Care should be taken in connecting rod design to provide proper grain flow in the forgings. Shape likewise facilitates the inspection of such parts, both in the rough and finished conditions (see Fig. 1). The determination of the proper material for each part requires careful consideration in order to maintain uniformity

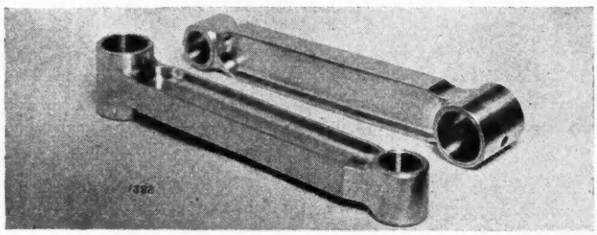


Fig. 1 — H-shaped connecting rods—their shape facilitates visual inspection

in production. Besides uniformity, consideration should be given to the characteristics of the material at operating temperatures. Very little information is even now available on this subject. It has been found in some cases that materials which are considered poor when cold are superior to others when hot. It is of great help to the inspection department to restrict the number of different kinds of steel to a minimum. This results in a slight increase in material cost, but goes a long way toward overcoming the possibility of poor material going into the fabrication of important parts. In our case only six different steels are used and no screw stock whatever. Case-hardened materials are to be avoided, on account of the difficulty of maintaining uniform strength. Often forged aluminum parts are used to advantage in the place of castings.

With a general idea of the quality standards required, and the part taken by the engineering department in setting up such standards, it is next in order to consider the functioning of the inspection department. Obviously the inspection department's primary duty is to see that the product meets the requirements of the engineering department that the work be done at a minimum cost and production suffer no unnecessary delays. For this reason the inspection department comes under the direction of the chief engineer, rather than under the factory manager, as is usually the case.

Fig. 2—Inspecting acid-etched connecting rod forgings for surface imperfections

*From paper read before Metropolitan Section, S. A. E.

With this arrangement, efficient scheduled production can be carried out only with the full cooperation of the manufacturing department, and to that end we enlist the aid of every foreman, sub-foreman and operator, constantly bringing before them the necessity for careful attention to all details of manufacture.

Our plant inspection system—which covers all material from the rough stage until it has been thoroughly tested in the finished unit—includes several different types of inspection.

In the case of rough materials—which comprise castings, forgings, bar stock, tubing, etc.—it is quite necessary to conduct inspections with the same care as is required for the inspection of finished parts. Quite obviously the passing of defective material in the raw state may result in considerable unnecessary machining expense. Inspection work on forgings and castings begins with a complete lay-out of the first casting produced from new patterns or lead proofs from new or changed dies. This must be done before parts are released for production.

All forgings when received are checked for hardness and marked with a lot number which is tied up with the lot number and heat number from the steel mill and forge shop. Certified copies of the physical tests are filed. Each master connecting rod and each crankshaft is given a special serial number, so that reference to the records at any time will reveal its entire history. The inspection of the rough forgings consists also of careful examination for cracks, laps, seams and other surface imperfections. The forgings are etched before this examination (Fig. 2).

Certain forgings from various lots are sectioned and etched, in order to examine them for grain flow. This is important in keeping engine weights down to a minimum, as maximum strength and resistance to fatigue are of prime importance. The matter of proper grain flow is necessary in most of the steel parts. Gear blanks, connecting rod forgings, crankshaft forgings and numerous other pieces are subject to these tests.

All castings before leaving the foundry receive their first inspection, which consists of a general check for shrinks, misruns, misplaced cores, water test and a tensile test of bars cast from the same heat of metal. A further check is made when the parts are received in the raw material inspection department. This consists of tests for hardness and a closer examination of the castings for dimensional defects. Each lot of castings at some time during operations are tested with water pressure, varying according to the nature of the casting. All pistons (Fig. 3), for example, are tested, before and after machining, at 500 pounds per square inch of water pressure and must be free from leaks at this pressure. Cylinder heads are tested under the same pressure both before and after shrinking onto the barrels.

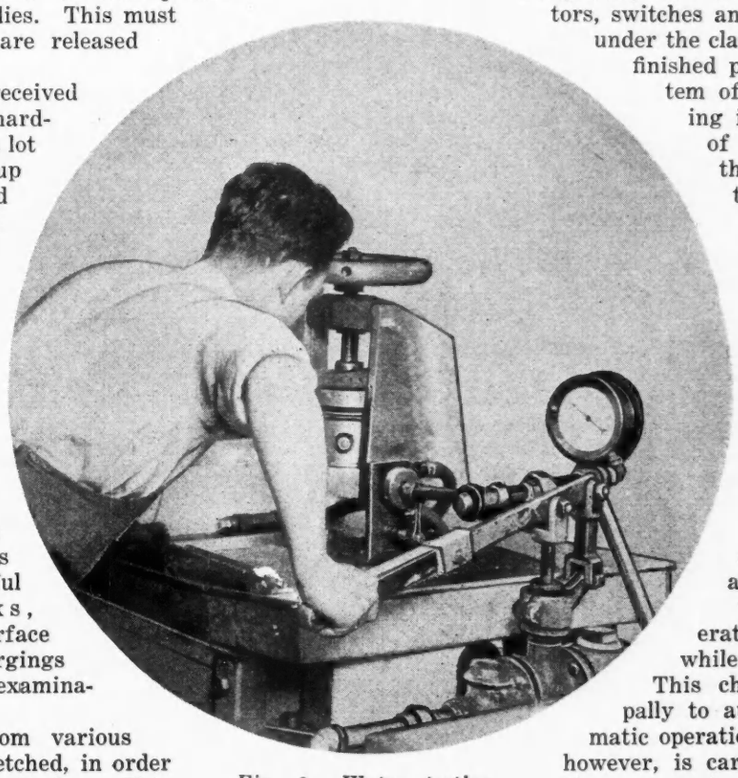


Fig. 3 — Water testing Wasp and Hornet pistons under 500 lb. pressure

Bar stock when received is tested for hardness and chemical composition regardless of previous checks at the steel mill before shipment. Each lot of material is stamped with a serial number. Each bar is checked for hardness on both ends and in the center and is carefully inspected for cracks, laps, pipes and other imperfections, by etching a piece out from the bar. In the case of bar stock for the more important parts, such as piston pins, knuckle pins, etc., every bar is analyzed for chemical composition. Each bar carries its own serial number and each piston pin is stamped with the bar number from which it is made. This number is carried through to the finished pin, making it possible to trace its history through permanent records to its origin at the rolling mill.

Magnetos, starters, generators, carburetors, switches and such like parts come under the classification of purchased finished parts. A complete system of inspection and checking is carried out on parts of this nature to insure that the parts will function properly when the engine is submitted to test and will not hold up expensive equipment. Beyond such inspections, these parts are checked in detail at the source of manufacture. Parts being shipped as spares are all checked 100 per cent, while certain other inspection operations are carried out at assembly.

Certain inspection operations are carried on while the work is in process. This checking applies principally to automatic or semi-automatic operations. Similar checking, however, is carried on during operations on most parts in order that any errors may be detected before an unnecessary amount of scrap is produced. But process inspection is primarily to insure accurate dimensional control of parts which are permanently attached to others during process of fabrication, such as cylinder heads (Fig. 4) and barrels. These and numerous other parts which become permanently attached to each other during the process of manufacture are subject to this type of inspection.

As well as careful inspection of component parts, it is, of course, essential to thoroughly check the assembled unit. To this end, each engine after assembly is belted in with an outside source of power for a period of time to be sure that all parts are functioning properly and to give the wearing surfaces some initial polish. An operation of this nature provides an opportunity to be sure that oil pumps, magnetos, fuel pumps, valves and other parts are functioning normally under such conditions. The test, however, is not considered of any great value in wearing in bearing surfaces, but is worth

while from the point of view of catching anything which may be wrong, such as the items mentioned, thereby again insuring freedom from delays when the engines are mounted on the test stand.

After belting in, the engines are submitted to a run in under their own power mounted on reaction torque stands and put through the manufacturer's test. This consists of nine hours' running at gradually increased throttle. They are then returned to the assembly department, completely torn down, the parts washed and carefully inspected (Fig. 5) to be sure that all bearing surfaces are wearing in normally and all parts functioning as they should. The engines are then again put up, and after a second run-in submitted to a final test, at which time they are operated at full throttle, the fuel and oil consumptions, oil pressure, fuel pressure, oil temperatures and other pertinent information noted. At this time checks are made for oil leaks, general operation, including starting, idling, acceleration, etc.

At the successful completion of the test the engines are washed, carefuly oiled to guard against rust during shipment, and packed. They are given a final external inspection before packing. Thus it will be seen that the inspection department must function from the time the work is started at the steel mill, foundry or forge shop until the product is packed for shipment.

Where quality is of such importance, it is essential that there be frequent checks on inspection. Diligence with a micrometer, for instance, is misplaced unless the micrometer itself is accurate. For this reason, all measuring devices are frequently checked against standards. Beyond this, the accuracy of the personnel should be frequently verified as well. This may be done in several ways. One of the best is to reinspect parts on the assembly floor. However, as a further complete check on the assembled engine, every sixty days a Wasp or Hornet engine is taken at random from the assembly line. The engine so taken is subjected to a fifty-hour endurance run. This practice is similar to that required by the Army and Navy before accepting a new type of engine on contract. It differs, however, in that the services only require the engine to be run at rated power in ten five-hour periods. The Pratt & Whitney test is at full throttle in five ten-hour periods.

An endurance run of this type is considerably more severe than ordinary production testing and represents the equivalent of several hundred flying hours. It serves as a complete check on all raw materials going into the engines as well as revealing any failure of the production department to follow the prescribed instructions on the heat-treating of parts, etc. It also curbs any unorthodox manufacturing practices which may creep in from time to time when attempting to meet a tight production schedule.

Inspection costs on precision work of relatively small production volume are bound to be high, as the quantities involved do not permit of special inspection set-ups. Of course, go and no-go snap gages and plug gages are used, and all the smaller modern inspection equipment.

Certain special checking fixtures are provided where necessary. Among these are rolling fixtures for gears and certain special checking fixtures for the inspection of castings to check for accurately placed cores. As the quantities have increased we have been able to bring in more and more special equipment, which cuts inspection costs without a reduction in quality. At present a visual inspection of each steel part is made for surface imperfections. It seems very probable that in the near future electric or magnetic apparatus will be available to do this work with greater accuracy.

Another phase of the inspection situation is the reduction of scrap and elimination of unnecessary labor on a piece by process inspection. Great care is taken first to be sure that the rough material is not defective. Then on the major parts process inspection is carried out at frequent intervals. This system involves a greater inspection cost, but reduces the manufacturing cost per engine on account of its effect on machine shop scrap. The system we have maintained in the plant provides for inspection in the various departments where the work is being manufactured, rather than sending all parts to a final inspection department. This saves a great deal of trucking. In cases where errors are found, the work is then close to the foreman and operators responsible for production of the parts, making it much easier to correct mistakes without undue delay and guard against a repetition of them. Dimensional accuracy is, of course, more easily maintained by the use of proper fixtures for each operation. Properly set up automatic machinery also acts as another aid. Just as it has been proven in other work, it is cheaper in the end to make the parts right than to try to fit parts with wide limits by selecting or hand fitting.

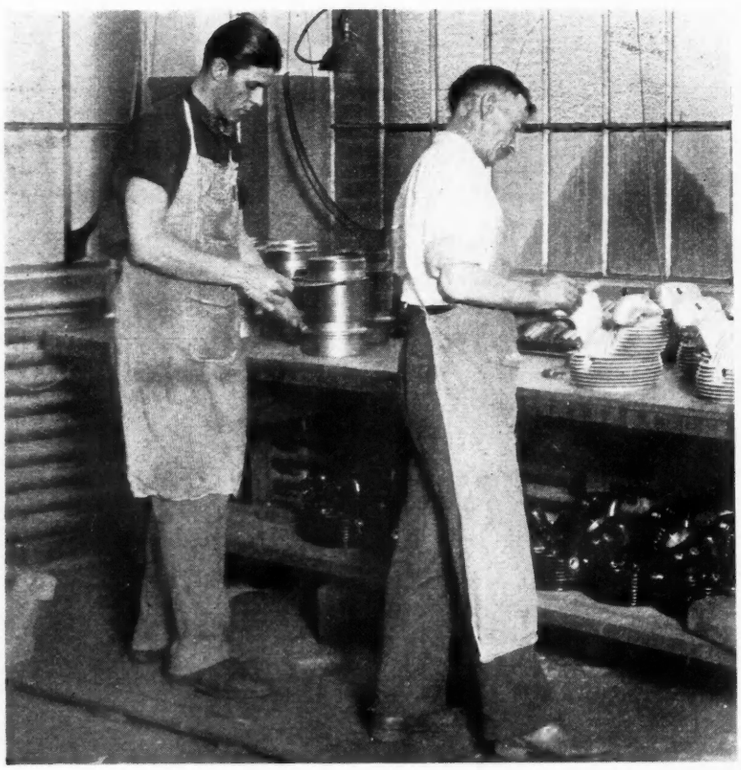


Fig. 4—Process inspection of cylinder heads and barrels before the assembly operation of shrinking

The question of quality standards is particularly important to the industry as a whole at the present time. The sudden enthusiasm for aviation has increased the volume of production of experienced manufacturers and, at the same time, induced a large number of relatively inexperienced companies to enter this field. Both of these conditions have a tendency to lower quality. A manufacturer's future business

depends upon the reputation of his product and therefore it behooves each one to maintain the highest standard of quality. This is perfectly possible for the established manufacturer, since he knows by experience what steps should be taken to insure a satisfactory product reaching the users. It is quite a different problem, however, for a new manufacturer entering the field, since the requirements are so different from those in any other mechanical industry. It is very easy for the inexperienced to set up unintentional quality standards which are not at all safe. Moreover, his methods of inspection may not be rigid enough.

The Federal government exercises a certain amount of control over quality. Any new type of powerplant must satisfactorily pass a type test as prescribed by the Department of Commerce. A certificate to this effect means that the design and fabrication of this sample engine is considered satisfactory. At the present time there is no particular check to insure the product of the manufacturer being similar to the sample that has been approved. The insurance companies, however, influence the maintenance of quality indirectly by their rates. This is a helpful situation, but, of course, is based on the performance of the powerplant once it is in service and does not necessarily preclude an inferior article reaching the hands of users.

Briefly, quality depends on a proper design as well as the selection, manufacture and inspection of the materials used in the fabrication of the powerplant. Dimensional defects very seldom reach a customer, and even if they do, are not apt to cause a forced landing. Proper material is of utmost importance. It will be a serious matter if any aircraft engines of inferior quality reach the hands of the public, since the welfare of the industry as a whole will suffer.

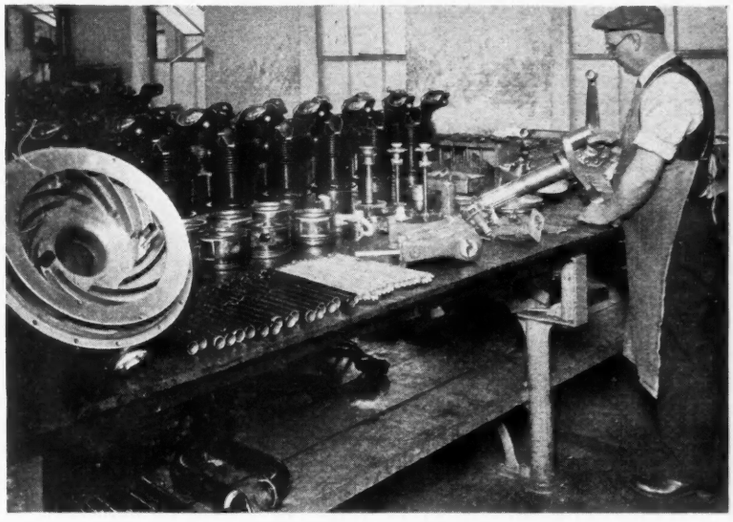


Fig. 5—Inspecting a Wasp engine torn down after the manufacturer's test

Ethylene-Glycol Tested for High Boiling Temperature

ETHYLENE-GLYCOL, the new cooling agent for use in water-cooled engines, developed by the Army Air Corps and the Curtiss Airplane & Motor Co., recently was given a practical test in a commercial plane. The fluid, similar in property to glycerine and marketed under the trade name of "Prestone" by the Curtiss Co., was fully described in April 13, 1929, issue of *Automotive Industries.*

View of two Falcon planes at Mitchel Field, N. Y., the Army flying base, where practical tests of ethylene-glycol were made. In the group inspecting the planes, from left to right, are James H. Collins, test pilot for the Curtiss Co.; William Crosswell of the Engineering Department; Frank H. Russell, vice-president of the Curtiss Co., and G. S. Ireland, vice-president of the Curtiss Flying Service. It will be noted that the radiator of the plane to the right, built to use the new fluid, has a much smaller frontal depth than the Army plane to the left, being from 15 to 3 in. less by actual measurement

Temperature and Pressure Effects Upon Engine Power Development

Practicability of various points of temperature measurement and applicability of correction factor to low-volatility fuel engines are discussed—Experiments cited.

By DANIEL ROESCH *
Associate Professor of Automotive Engineering, Armour Institute of Technology

THE power developed by an internal combustion engine is dependent upon the number of B.t.u. in the charge which is taken into the cylinder. The temperature and pressure of the charge in the cylinder and the volumetric efficiency (by card) are factors which determine the B.t.u. in the charge. These factors are not readily determined, although the volumetric efficiency by the card can be quite accurately obtained for low speed engines. Since engines are tested at various laboratory temperatures and pressures, it is essential to convert all test data to some standard of temperature and pressure, and to know the general effects of variation in the observed temperature and pressure upon the power developed.

Barometer readings are usually taken during engine tests. If the intake manifold depression and the intake valve pressure drop are subtracted from the barometer reading the result will be the actual pressure of the charge in the cylinder. The apparent correction formula would then be:

$$\text{I.H.P. (Std.)} = \text{I.H.P. (Actual)} \frac{29.92 - (\text{M.D.} + \text{V.P.D.})}{\text{Bar (Test)} - (\text{M.D.} + \text{V.P.D.})} \quad (1)$$

where 29.92 = Standard Barometer (In. Hg.)
M.D. = Manifold Depression (In. Hg.)
V.P.D = Valve Pressure Drop (In. Hg.)

The accepted formula used in engine tests is

$$\text{I.H.P. Std.} = \text{I.H.P. Actual} \frac{29.92}{\text{Barometer (Test)}} \quad (2)$$

The difference in results when operating at wide open throttle and moderate speeds corresponds to values of (M.D. + V.P.D.) equaling 1 or 2 in. of mercury. For low altitudes and engines operating at wide open throttle there is little practical difference, but for high altitude testing and for corrections made at part throttle or with high velocity intake systems the added factor in the correction formula may be desirable. This condition also prevails when operating at high engine speeds. Taking into consideration that any effects produced by a particular engine design should not be included in the correction factor, then the modified formula would seem applicable only to high altitude test corrections and include a general arbitrary constant subtracted from the barometric readings.

The correction factors by formula (1) and (2) when computed for a 1.5 in. Hg. total pressure drop with (a) 28.5 in., (b) 24.5 in. and (c) 18.0 in. Barometer will be as follows:

* *(From the "Armour Engineer")*

Barometer In.Hg.	Approximate Altitude, Ft.	Correction (1)	Factors (2)	Variation Per Cent
28.5	1,500	1.052	1.050	0.6
24.5	5,500	1.234	1.221	1.1
18.0	13,000	1.723	1.663	3.8

The variation in the results obtained by the two formulas is usually too small to warrant the additional complication except in special cases. Moreover, high altitude tests are usually reported per se.

The use of this characteristic formula for B.H.P. corrections involves an approximately constant "friction" power subtracted from each of the I.H.P. values and introduces a slight difference in the power ratios. For most test work, however, the same form is used. The pumping loss of the "friction" power changes only slightly with the barometer and the mechanical friction does not change materially except for large power changes. Moreover, the mechanical efficiencies are usually quite high and when determined provide data for computing the necessary changes in the formula.

The temperature correction factor is often subject to influences which are greater in number and magnitude than those affecting the pressure correction.

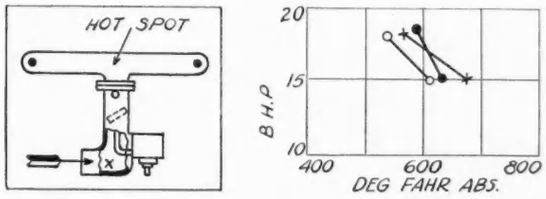
The choice of the point in the induction system at which the temperature is observed may be:

(a) Room temperature.
(b) Hot air entrance to carburetor.
(c) Carbureted air at outlet of carburetor.
(d) Intake manifold after hot spot.
(e) Cylinder mixture temperature at end of suction stroke.
(f) Cylinder mixture temperature at the point where the compression line crosses the atmospheric pressure line.

The temperature at point (f) is undoubtedly the most reliable for ascertaining the B.t.u. in the charge, and therefore the proper power correction factor. It is open to the objections that engine and manifold design characteristics are included and that it is very difficult to determine accurately. Obviously, an engine which must be operated very hot for satisfactory fuel vaporization, and distribution (as with kerosene) should not be credited with the resulting large power correction which its high temperature would give by the formula. The temperature at point (b) has similar conditions surrounding its use.

The temperature at (a) does not include satisfactorily the engine and fuel requirements. Usually a hot air stove is provided to heat the air entering the

carburetor to the desired temperature. This temperature (b) is often recorded in tests. If it has been adjusted to the minimum required for satisfactory engine operation (vaporization and distribution), then it would hardly seem fair to credit the engine with an increased power resulting from using this temperature in a power correction formula, since the fuel consumption would undoubtedly be greater with colder air. The temperature (c) at the outlet of the carburetor is difficult to determine experimentally, owing to the fact that an appreciable time is required for the fuel to vaporize, and a wet-bulb effect is produced. Exploration of the region immediately above the carburetor jet gives variable wet-bulb temperatures, and thus indicates that the charge there is stratified, as



Figs. 1 and 1a—Diagram showing locations of thermo-couples in carburetor and manifold, and variation of B.H.P. with temperatures at three points of measurement

would be expected. The time required for effecting complete vaporization was determined approximately by observing the distance above the expanded gasoline jet at which the wet bulb effect disappeared. Knowing the size of the pipe and the air density at this point, corrected for temperature, this time was found to be 0.005 second for one set of test conditions.

It was necessary to use a spacer between the carburetor flange and the manifold flange, to prevent an undue influence by radiation from the hot spot, which is located in the manifold directly above the points where temperature measurements were made. The temperatures at this point evidently are not suitable for use as reference temperatures, since the wet-bulb effect and radiation from the hot spot make them uncertain. In most commercial installations, wet-bulb and radiation effects are present also in the branches of the manifold.

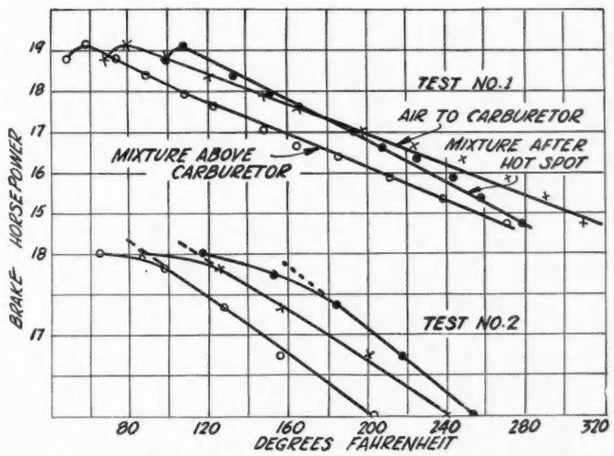


Fig. 2—Brake horsepowers plotted against Fahrenheit temperatures. Results of two tests

At point (d), where the mixture is about to pass through the inlet valve, it is in a conditioned state. Passage through the inlet valve has a certain heating effect, heat being supplied by the valve, the combustion chamber walls and the residual gases. In special cases, however, where the air is highly preheated under conditions of low explosion pressures at light loads and high ratios of expansion, there sometimes are indications of a cooling effect on the gases as they enter the cylinder. This, moreover, is the last point along the path of flow for which reliable temperature data can be readily obtained experimentally.

Observations were made of the temperature (b) of the entering air; of the temperature (c) of the carbureted air above the outlet of the carburetor, and of the temperature (d) of the mixture in the inlet manifold just before it enters the cylinder block. These temperatures are plotted in the accompanying figures. Two series of runs were made on a 149 cu. in four-cylinder engine at 1000 r.p.m. and wide-open throttle. Test No. 1 was made with a volumetric compression ratio of 5.7 to 1, and test No. 2 with a ratio of 4.6 to 1.

The fuel used was not specially adapted to the particular compressions and high temperatures, and the spark advance was not adjusted for best power but was fixed in each case. For maximum power the spark advance should be changed with each change in temperature, and the detonation requirements

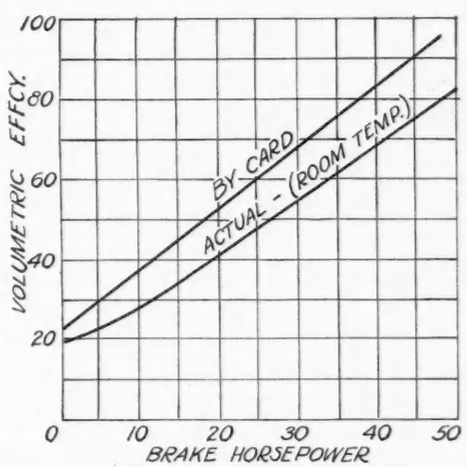


Fig. 3—Variation of volumetric efficiency with brake horsepower. (Volumetric efficiencies determined from indicator cards and by means of air-meter and gas-meter)

should be taken care of by using fuels suitable for the particular compression ratio and also for the high temperatures used in some of the tests.

In Figs. 1 and 2 the crosses represent intake-air temperatures; the circles, temperatures of the mixture above the carburetor, and the black circles, intake manifold temperatures. A straight line drawn through the two corresponding observation points is taken as the power correction line for temperature. The value of the exponent n in the theoretical equation

$$\text{B.H.P.}_{\text{std.}} = \text{B.H.P.}_{\text{act.}} \left[\frac{T_{\text{act.}}\ (\text{abs.})}{T_{\text{std.}}\ (\text{abs.})} \right]^n$$

is commonly taken as 0.5. If the value of n is computed from the experimental data shown the following values are obtained:

Test No. 1			Exponent B.H.P.	"n" I.H.P.
Station No. 1	(Crosses)	(Air to Carb.).....	0.741	0.629
Station No. 3	(Circles)	(Mix. above Carb.).....	0.761	0.645
Station No. 10	(Dots)	(Mix. after Hot Spot)...	0.995	0.776

Test No. 2			
Station No. 4 (Crosses)	(Air to Carb.).....	0.587	0.499
Station No. 7 (Circles)	(Mix above Carb.).....	0.621	0.526
Station No. 8/10 (Dots)	(Mix. after Hot Spot—Average of two branch pipes)	0.776	0.658

In order to agree with the theoretical formula exactly there should be a slight dip in the curve. Some of the observed values indicate this trend. Further deductions are difficult because of the lack of information on the heat transfer with variable-velocity flow through the system and the uncertainty of the time necessary to completely eliminate wet bulb effects. The difference between the values computed by this method and the straight line funcation as drawn is only 0.2 B.H.P. at the mid-position of the air to carburetor (crosses) in Test No. 1. The line shows 16.75 B.H.P. at 209 deg. Fahr. while the computed value is 16.55 H.P.

The straight line characteristic is represented by the general formula:

$$\text{Power Ratio} = 1 + \frac{t}{k} \qquad \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

The test data give the following values of k:

		Value of "k"	
Test No. 1		**B.H.P.**	**I.H.P.**
Station No. 1 (Crosses)	(Air to Carb.).....	807	940
Station No. 3 (Circles)	(Mix. above Carb.).....	738	860
Station No. 10 (Dots)	(Mix. after Hot Spot)...	593	690
Test No. 2			
Station No. 4 (Crosses)	(Air to Carb.).....	1025	1163
Station No. 7 (Circles)	(Mix. above Carburetor)	921	1045
Station No. 8/10 (Dots)	(Mix. after Hot Spot—Average of two branch pipes)	808	918

The data is subject to modification when the optimum spark advance is used at the various temperatures, and also when the mixture ratio is fixed at the various tests. In these tests a fixed spark was used, too late for maximum power. The carburetor adjustment was not changed during either series of tests. In test No. 1 the mixture ratio varied from 13.1 to 1 at the highest temperature, to 14.8 to 1 at the lowest temperature. The corresponding gasoline temperature, as measured in the passage between the float chamber and the nozzle, ranged from 90 to 60 deg. Fahr. There was no evidence of gas formation in the passage, which usually results in an appreciable loss of power due to "leaning" of the mixture. Air-meter readings were not taken during test No. 2.

It would appear that, in the absence of test data bearing directly on the effects of temperature changes on the power of a particular engine, the "square-root" formula gives a satisfactory temperature correction value. For accurate results the correction factor should be determined for the particular engine and the particular operating conditions. When applying a temperature correction factor, consideration should always be given to whether or not the engine would operate satisfactorily at the standard temperature. It is obviously unfair to credit an engine with increased power at a lower temperature than the temperature prevailing during the test, if the higher temperature is necessary for satisfactory atomization and distribution.

It would thus appear that a correction factor for power output proportional to the atmospheric pressure gives satisfactory results, except in special cases of intake systems with high pressure drop and of tests made under high-altitude conditions. Owing to the increasing importance of the anti-knock value of fuels, consideration should be given to the ability of the engine to operate successfully at the standard atmospheric pressure, if that happens to be higher than the atmospheric pressure at the time of the tests. An engine that is tested when the barometer reading is from 1 to 2 in. below normal may be at the point of incipient detonation and not operate satisfactorily under the higher normal atmospheric pressure. A change in atmospheric pressure equal to 2 in. of mercury column corresponds approximately to a change of 0.25 in the volumetric compression ratio.

Fig. 1 shows the locations of the thermo-couples for measuring the temperatures at the various points of the intake system previously referred to, and indicates the variations of engine B.H.P. with the temperatures at the various points of measurement.

Fig. 2 is an enlarged graph of the data taken during tests Nos. 1 and 2. The pronounced drop in power at the lower temperatures in test No. 1 is attributed to poor distribution. This effect is also shown in test No. 2 and indicates the importance of limiting the application of the general correction factor.

Fig. 3 is a record of a student's routine test on a constant-speed gas engine. In calculating the actual volumetric efficiencies, use was made of the gas and air meter readings, corrected to room temperature, while the volumetric efficiency by card was determined from the stop-motion indicator cards. These graphs give an idea of the temperature increase of the mixture in the cylinder. In these runs the spark was set to give maximum power for each throttle setting.

Lubrication of Cylinder Walls

THAT cylinder walls of an engine with force feed lubrication receive very little oil for some time after the engine is started in cold weather is well known to American engineers, but the following experiment, described by Henri Petit before the Societe des Ingenieurs de L'Automobile is of interest as showing that there is no lubrication even at moderate temperatures.

The experiment referred to was made to the Leon Bollee works and was carried out as follows: The cylinders and pistons were removed from an engine, and the upper ends of the connecting rods were held by means of levers so they would not hammer against the crankcase wall when the crankshaft was rotated. The crankshaft was then driven by belt, the crankcase having been supplied with oil at atmospheric temperature, which happened to be 59 deg. Fahr. The top of the crankcase was entirely open and it was therefore easy to observe any projections of oil. Up to 1000 r.p.m., with an oil temperature of 59 deg. Fahr., there were absolutely no projections of oil on the outside of the case. From this the conclusion may be drawn that under the conditions of the experiment the cylinders and the pistons would have received no lubricant whatever. Now, 59 deg. is a temperature normally encountered in these latitudes and at which the oil is often maintained for considerable periods.

Just Among Ourselves

Factories, Dealers and Airplanes

RELATIVELY few automobile dealers have actually taken on airplane lines, but as one talks to distributors and retailers here and there a very lively interest in the future of the aviation business is quite evident. Most car company executives look with disfavor on the addition of airplane lines by their dealers, largely because a vast majority of retailers still are none too adequately financed to carry on their businesses as forcefully as is desirable in these times of forceful competition. There is no tendency, on the other hand, to regard the new form of transportation as a business rival. Many automotive executives are financially interested in its development and most others are eager to see it succeed. In addition to the automotive companies already actively engaged in the manufacture of planes or engines, several others are certain to enter the aviation field in the next few years. It is hard to believe, as a matter of fact, that big organizations such as General Motors can remain out of this important field permanently.

* * *

Airplane Neither Menace Nor Aid to Car Dealer

VIEWS of C. A. Vane about the automobile dealer and the airplane business are particularly interesting at this time. In his last N.A.D.A. bulletin, commenting on the close of the Detroit air show, Mr. Vane says:

"We do not regard the airplane either as a menace or an aid to the automobile dealer's business. Airplanes in their present form are developing to parallel and supplement the railroad business, rather than the automobile business. Operation of the airplane is still a highly technical accomplishment. The automobile, on the contrary, can be handled by anyone. It has been the simplicity of operation which has made the automobile available to the masses.

"Until the airplane reaches this stage supplemented by adequate airports and dispatching, it will not be available for any such numbers as passenger automobiles. Despite that limitation, however, it will be a great and progressive industry." . . . . All of which sounds to us like extremely good sense.

* * *

MacManus Book is Vivid, Human Document

WE will guarantee you the most delightful evening you have spent in some time if you will get "Men, Money and Motors," the new book in which Theodore MacManus and Norman Beasley tell the history of the automobile business in terms of human beings, human incidents and human aspirations. Writing of men and events known intimately to him, Mr. MacManus relates the casual beginnings of many great automotive events and throws new, human lights on the men who have built the industry.

He recounts an argument between Henry Ford and James Couzens, at the end of which Ford is seen acceding to Couzens' demand that the workers be paid $5 a day; there is the tale of John Willys' successful last-minute efforts in providing the $350 necessary to meet the payroll of the old Indianapolis Overland company and thus saving the firm from bankruptcy and protecting the $10,000 which he had given them as advance payment on automobiles; the day when Kettering with a broken leg lay under an old Cadillac to put back into running order the only self-starter left in existence after "the other one" had been destroyed by fire; the wonderful loyalty of Fred Zeeder to Walter Chrysler, which resulted in Zeeder's keeping in his desk drawer the design for his new type of automobile until such time as Chrysler was in a position to build it, even though that withholding meant the turning down of interest in the design expressed by Willys, Durant, White, Studebaker and others.

These are only a few of the intimate incidents about men and events automotive which MacManus and Beasley make vivid in simple conversational terms. It's a book which can't be described even reasonably well; it needs to be read. You can't help but enjoy it. Harper & Brothers have published it and it costs $3.

* * *

Lack of Expression Ability Clogs Progress

DR. HARVEY N. DAVIS, president of Stevens Institute of Technology, said recently: "The engineering field is clogged by men whose technical training has been thorough but who, because of their poor spoken and written English are unable to move up to positions of leadership. . . . This is unfortunate because there never was a time when there existed greater confidence in the abilities of the engineering type of mind."

Dr. Davis' use of the term "clogged" seems particularly apt. From the standpoint of the individual, development or lack of development of his complete possibilities certainly is his own business. From the standpoint of business organization, however, lack of full development on the part of an individual does constitute a clogging-up process whose ill effects the business as well as the individual eventually must feel.

—N. G. S.

Mechanical *Handling Systems* Require

A.S.M.E. Handling Division how the automotive indus stock conveying. Sever

By K. W.

THE necessity for adequate control of materials as a foundation upon which to construct a mechanical handling system; the need for constant mental alertness to keep operating procedures at highest efficiency and the very wide applicability of methods developed and perfected for specific material handling problems, were the major points brought out at a meeting of material handling engineers in Detroit last week.

The meeting was held by the Materials Handling Division of the American Society of Mechanical Engineers in cooperation with the American Management Association and consisted almost entirely of showing, by talks and inspection trips, how the automotive industry has solved materials handling problems. Throughout the meeting great emphasis was placed upon the possibility of applying automotive methods to every other type of industry, and as a corollary, the application of the methods described to other types of automotive plants was demonstrated.

Early in the meeting it was pointed out that even vehicle plants, which have often been considered in an ideal position to install mechanical handling systems because of the even flow of work in operation, now have to solve problems as difficult as nearly any other type of industry. With the increase in the number of chassis built in a single plant, the variety of body models and a large choice of color combinations it is no longer true that a continuous stream of a single product can be carried along the production line.

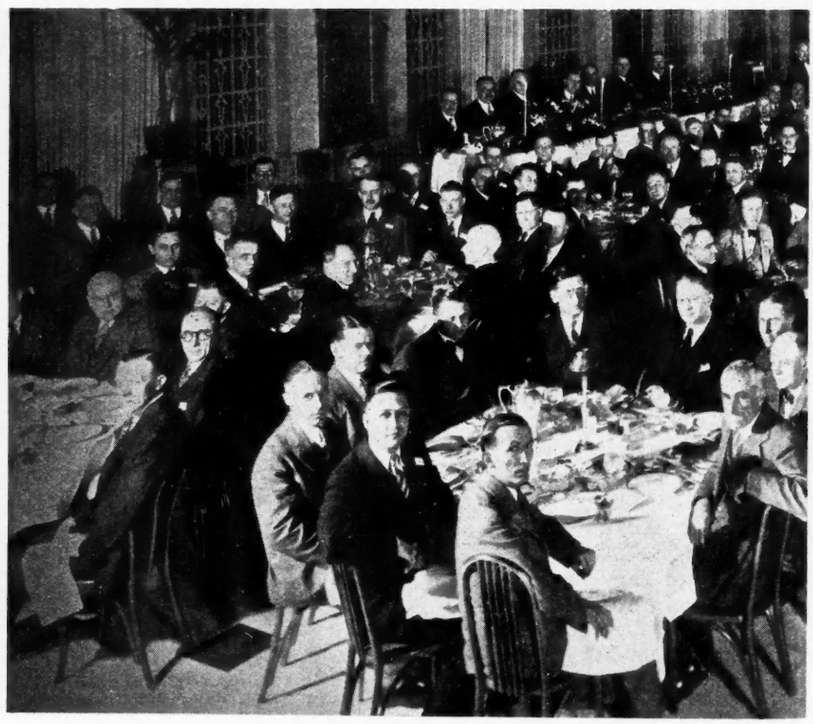
In solving the many problems involved by this multiplicity of product varieties, the automotive industry has demonstrated how other industries and the smaller jobbing plants in the automotive industry can effectively apply mechanical handling equipment to their work.

In a general survey of materials handling problems, John Carmody, editor of *Factory and Industrial Management*, pointed out that mental inertia is the greatest obstacle to the introduction of modern methods. Plants making gears, transmissions and other small parts sometimes believe that methods proved successful in vehicle plants are not applicable to their own operations because their work is different. While this may be true sometimes in the details of an installation, enough progress has been made by open-minded plant managers to prove that the fundamentals of materials handling are identical, regardless of the product made, and that in nearly every instance ideas can be transferred almost bodily from one industry to another and, particularly, between plants in the same industry.

Carrying this idea still further, the final session of the meeting was devoted to four papers which related just how automotive ideas of materials handling had been applied to widely different industries with the same profitable results as had been obtained in their original installations.

C. W. Avery, president of Murray Body Corp., told how the Ford organizations had revolutionized the plate glass making industry simply by introducing to that work the same continuous processes and methods of handling materials which had been proved successful in making Ford cars. Mr. Avery said that there is just one answer to the question "Can motor car methods be applied to other industries?" and that is, "It has and is being done." The success with which this installation was made, over the protests of nearly everyone who was familiar with plate glass making methods, is an excellent illustration of the wide range of applicability of ideas if approached with an open mind.

During the same session, other papers were presented showing how automotive materials handling methods have been applied with great success to such widely different fields as the electrical industry, the stove industry and the washing machine industry. At the conclusion of the papers and their discussion, the listener was obliged to believe that there was no material han-



View of the members and guests at the banquet held during the meeting pices of the A.S.M.E. in conjunction with

Adequate *Control* of *Materials*

in Detroit Meeting is shown try has solved problems in al plants are inspected

STILLMAN

dling problem so difficult or so different that they could not be solved with a considerable degree of satisfaction by the study made by an open-minded production executive of what has been done in other industries.

In the opening session of the meeting, James Lynah, director of staff, Works Managers Committee, General Motors Corp., in discussing management as applied to materials handling, expressed the view that conservation of human effort should play a major part in the adoption of mechanical handling equipment. A properly designed materials handling system, coupled with an effective incentive plan of wage payment, not only reduces fatigue but permits a great increase in material turnover which, in the last analysis, Mr. Lynah believes, is the measure of effectiveness of the material handling system.

In some of the General Motors units turnover of material is as high at 20 times a year, while for the entire organization the present inventory is valued at only five million dollars more than in 1925 although production now is 150 per cent greater.

While much of the credit for this improvement rests with mechanical handling equipment, Mr. Lynah emphasized the point that control of material prior to its handling was an absolutely essential item. While General Motors sales forecasts are made four months in advance of requirements, actual sales data are received from retail outlets every 10 days and shipments, production and even the ordering and releasing of purchased materials are modified as these reports indicate to be advisable.

Such a definite control over the flow of materials from the original sources through the production lines to the completed product is essential to the successful operation of any handling system, and Mr. Lynah emphasized the importance of wage incentives in obtaining the full cooperation of employees in making the plan of operation work without friction.

In a later session, Howard Flagg, of the General Motors advisory staff, discussed in detail the fundamentals of material control, again the discussion being postulated on the fact that without adequate control of materials, mechanical handling equipment of the best possible design cannot function entirely satisfactory In general, the system of material control which has proved most satisfactory, according to Mr. Flagg, is that which was described in detail in *Automotive Industries* of Nov. 17, 1928, as applied to the Ternstedt Mfg. Co.

During this same session, L. A. Churgay, Sr., of the Chrysler Corp., discussed the problem of routing miscellaneous parts to the assembly lines. In vehicle plants, chassis, bodies, engines, fenders, wheels, and similiar items are frequently moved through processes and through final assembly operations by means of conveyers. There still remains a great number of miscellaneous parts which cannot be moved economically in this manner and Mr. Churgay's paper dealt with material of this nature—material which is common to all types of plants and must be handled and controlled as efficiently as possible.

of the material handling engineers in Detroit last week under the aus- the American Management Association

The requirements for all of these items were determined from material lists and a schedule of shipments compiled which would insure enough material being delivered at definitely stated intervals to keep pace with production at any rate. A comprehensive record system was devised to keep track of the movements of each item, and the factory delivery system of electric trucks and trailers was very closely tied in with the material control organization.

An interesting feature of this plan, as described by Mr. Churgay, was the method employed to care for changes in production schedules. Material movement schedules were based on a definite rate of output of completed cars and deliveries of materials are made in time units; that is, for 400 completed cars daily a certain

number of deliveries of each item of material must be made to the assembly line daily, or once every two, three, four, etc., days. Should production schedules be altered, the quantities of material delivered per load are not changed, but the time element in the delivery system is modified.

For example, should production be increased 25 per cent, deliveries of material are made at the usual rate and in the same sequence as before but deliveries are made for 25 per cent longer time each day. When production schedules are lowered, the delivery system ceases to function for a period less than the regular working day corresponding to the percentage decrease in production from the standard schedules.

A number of papers were devoted to detail description of modern materials handling layouts in automotive plants and these, supplemented with inspection trips each morning of the meeting, gave those not familiar with automotive methods a good picture of how far the industry has gone in eliminating manual moving and handling of materials.

A very interesting description of the development of materials handling equipment in the Wilson Foundry and Machine Company's plant at Pontiac was given by L. W. Pardee, plant engineer. The problem in this plant was complicated by the fact that its location was between a railroad and a city street so that physical expansion to meet increased demands for its products was impossible.

The last building on the site was built in 1919, and at that time the output capacity of the plant was about 250 tons daily. Without any increase in floor space, but simply by the development and installation of modern materials handling equipment and methods, the same plant is now turning out from 450 to 500 tons daily.

Continuous molding and pouring conveyors have been installed as well as cupola charging equipment by means of which from 450 to 500 tons of metal produced are charged by 23 men, and in many other minor installations mechanical equipment has been employed to increase productive facilities without an increase in floor space. Many plants often find themselves in a similar position and the way which one company has solved the problem should be of great value to them in suggesting a solution.

Forge shops have usually been considered as among those places which are different and in which methods used in other types of work cannot be applied. The incorrectness of this argument has been proved conclusively by the experience of the Chevrolet Motor Co. in its forge plant in Detroit, the operation of which was described by Hugh Dean, manager of the plant. Not only has it installed a great deal of mechanical handling equipment throughout the plant, but recently there has been placed in operation a crankshaft forge shop which is practically automatic—conveyorized nearly 100 per cent.

Automatic furnaces heat the raw stock and it is taken to the trimming presses, upsetters, and restrike hammers, by monorail conveyors which then deliver the crankshaft to the heat treating furnaces. From the heat treat, the crankshafts are shoved on carriers while still hot and are carried through quench heat ovens and automatically picked off and quenched.

Again on carriers, they pass through draw heats and then, by gravity conveyors, are carried to straightening presses, through a pickling bath and to the grinders. Here, the crankshafts are ground for Brinell tests and then are placed on slat conveyors where they are tested, indexed and inspected and finally delivered directly to cars for shipment. Flashing and ends are also disposed of by monorail conveyors and are carried directly from the trimming presses to gondola cars and automatically dumped.

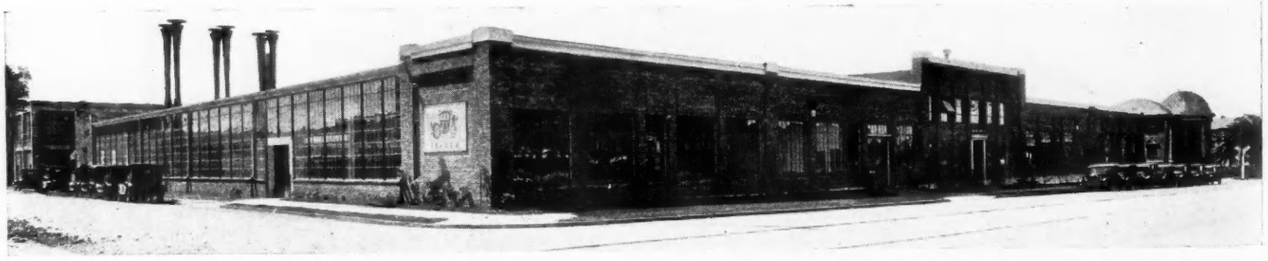
The part which materials handling plays in the cleaning and painting of instrument boards, garnish moldings and similar sheet metal parts not a direct part of the body, was described by William Pfeil of Studebaker Corp.

In moving manufacturing operations from Detroit to South Bend last year, Studebaker encountered the problem of producing twice as many hoods and fender sets in the same floor space. Mr. Pfeil described in detail the overhead monorail conveyor finally installed which permitted this increase in production to take place. The available floor space was about 60,000 sq. ft., and the former capacity of the space was 400 hoods and 350 sets of fenders. With the conveyor installation completed and working, production was jumped to 800 hoods and 750 sets of fenders, while rejections decreased 25 per cent and a total labor saving of 15 per cent was made.

In a similar installation for the production of instrument boards and garnish moldings, about 32,000 sq. ft. of floor space was made to produce 4875 garnish moldings, 800 instrument boards and 2700 garnish door panels daily, an increase over former production in the same floor space of about 200 per cent. At the same time costs were cut about 35 per cent.

H. B. HENDRICKSON of the Bureau of Standards, has designed a new airplane thermometer by which the minimum temperature of the air through which the plane is passing can be automatically recorded. The new instrument makes use of a bimetal strip and is mounted on one of the struts of the plane, the announcement stated.

Fisher Body Service Station



View of Fisher Body Corporation service station, two of which have been opened by the General Motors Corporation, one in Detroit and one in Oakland, Cal.

THE FORUM

Trend in *Balloon Tires* Follows *Wheel-Size* Numbers

Editor, AUTOMOTIVE INDUSTRIES:

The survey by P. M. Heldt on "Tire Standardization" in the March 16 *Automotive Industries* particularly serves a good purpose by keeping the question before those engineers in the tire and car industries who decide original tire equipment.

While it is difficult to check Mr. Heldt's data without knowing fairly exactly the dates of the Chilton Specifications used—these specifications change from month to month—we disagree with him that he has established his title premise that "statistics show the trend has been away from wheel uniformity."

Our own data, which are subject to the same possible variations as Chilton Specifications, indicate in another way what has taken place during the past fourteen months.

TABLE I

Car Models Using Different Diameter Wheels

Wheel Size	18 in.	19 in.	20 in.	21 in.	Total	Tire Sizes
Feb. 1, 1928	22	37	37	12	108	24
April 1, 1929	24	48	26	2	100	21

As of Feb. 1, 1928, on the above cars there were 24 different tire sizes, not considering different plies; as of April 1, 1929, 21 different sizes.

This tabulation indicates a trend in reduction of heights and numbers of wheels as well as a slight trend in reduction of tire sizes.

The trend toward 18-in. and 19-in. wheels will continue particularly from the 20-in. wheel to the 19-in. wheel, as the heavier cars on 20-in. wheels revise design. When this occurs, another problem must be faced, namely, of building sufficient capacity in the 7.00-19 tire to carry our heavier cars.

One new size, 4.50-20 for Chevrolet, has been introduced and recognized as a standard. Four old sizes were discontinued: 5.25-21, 6.00-21, 6.20-21 and 6.75-21.

Another new size, 7.00-19, should and probably will be included in the original equipment lists. The elimination of the 4.75-19 and the 5.25-18 has been proposed, but in our opinion the latter should be retained, as it is being used, and in all probability will continue to be used, by large production cars. Mr. Heldt's statement that 5.25-18 size is not used in 1929 is in error, since this tire is standard equipment on the Oldsmobile 6, Model F-29, in appreciable production.

This will leave the table with 16 or 20 sizes as shown in Table II.

To have held down the number of original equipment tires during the past year is an accomplishment of no small importance. To further reduce sizes without economically hampering design is the aim and hope of all farsighted engineers of the related industries.

B. J. LEMON,
Field Engineer, U. S. Rubber Co.

(The figures given in the article in our issue of March 16 were based on specifications in *Automotive Industries Statistical Issue,* published in February, and therefore represent practice on Jan. 1, 1928, and Jan. 1, 1929, respectively. These specifications show that on Jan. 1, 1928, 110 different car models carried 22 different sizes of tire, while on Jan. 1, 1929, 96 models of cars carried 28 different sizes of tire. If the number of tire sizes mounted on new cars decreased from 28 on Jan. 1 to 22 on April 1 of this year, that indicates a recent rapid improvement in the situation.—*Editor.)*

Engine Bearing Arrangements

Editor, AUTOMOTIVE INDUSTRIES:

We sometimes find that after an overhaul, the timing gears are less silent than before. The cause appears to be this. The main bearings have worn, and we have to scrape them a little to secure a good fit. The result is that after the overhaul the crankshaft occupies a slightly different position, and hence the pitch circle of the timing gears is altered, which leads to noise.

The remedy is only in the hands of the manufacturer and not the mechanic. The upper half of the bearing should be made separately and then fitted to the crankcase. This would permit the placing of suitable packing between the two, during an overhaul. Then there will be no change of position of the crankshaft owing to wear and scraping, and the pitch circle will be maintained.

V. VENUSAWMY IYENGAR,
Motor Engineer,
Madura, India.

TABLE II

Rim Diam.	4.50	4.75	5.00	5.25	5.50	6.00	6.50	7.00
18				*5.25–18	5.50–18	6.00–18	6.50–18	7.00–18
19		*4.75–19	5.00–19	5.25–19	5.50–19	6.00–19	6.50–19	**7.00–19
20	4.50–20	4.75–20	5.00–20		*5.50–20	6.00–20	6.50–20	7.00–20
21	4.50-21							

*May be eliminated. **May be introduced.

Unusual Machining Operations Possible on New Fay Lathe

Performance of unit is due to the number of cutting tools and attachments which may be operated simultaneously, and to the automatic functioning of the machine.

SOME rather unusual machining operations are made possible by the use of the new 24-in. Fay automatic lathe, recently brought out by the Jones & Lamson Machine Co., because of the number of cutting tools and attachments which may be used simultaneously and because of the automatic operation of the machine.

In Fig. 1 are shown two of these machines employed in machining large roller bearings which, while not strictly automotive work, are similar to jobs which are performed in many automotive plants. The machine on the right is used for the first operation, while that on the left is employed for the second operation on the part.

In the first operation the part is chucked from the inside and tools on the back of the carriage rough turn the outside diameter while a tool on the back arm faces one end. At the end of the stroke, the tools on the carriage also rough and finish-chamfer and radius the outside and inside of the outer end of the forging. The machine then goes into fast motion, the carriage is rocked forward and the tool on the front of the carriage finish-turns the outside diameter on the return stroke, while the second tool in the back arm finishes the outer radius.

A special carriage is used on this machine, equipped with two sets of tools, one in the front side and one in the back side. Using this in connection with the back arm makes possible roughing and finishing cuts all over on a variety of work.

For the second operation, the work passes to the machine shown at the left in Fig. 1. The inside diameter of the race is finished on a sphere. The carriage has a double control former, the former slide having two positions, one of which is used for rough profiling the inside spherical diameter with a tool on the front of the carriage, while the other position is used for finish profiling the inside diameter with a tool on the back of the carriage.

About an inch of stock is removed from the bore. The forgings are about 14 in. in diameter and 5 in. wide. The material is tough ball bearing steel, which

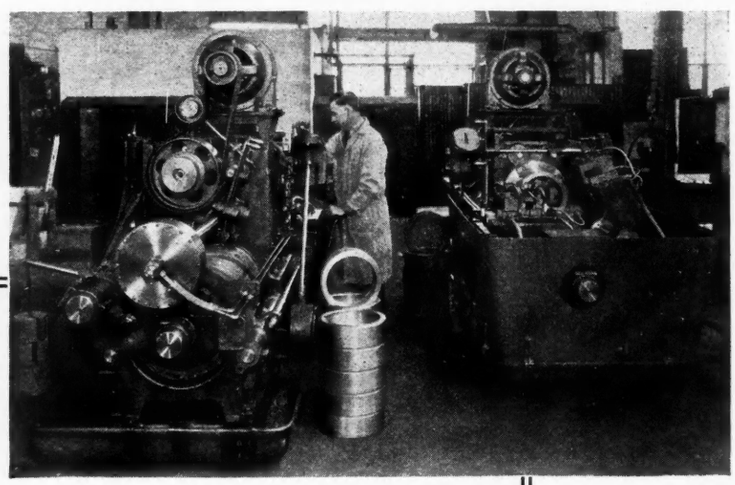


Fig. 1 (above)—Two Fay 24-in. automatics used to machine large roller bearings

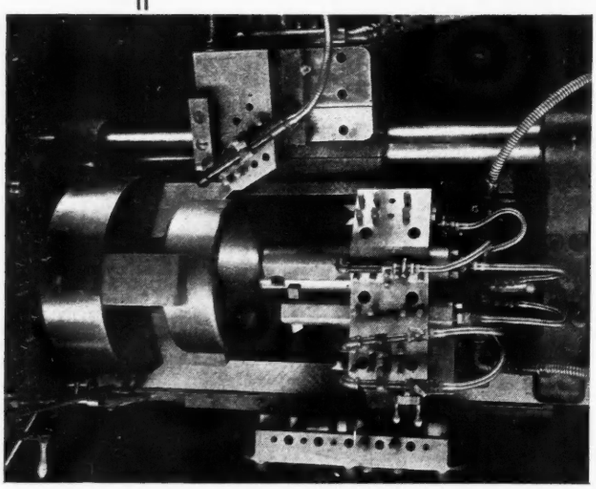


Fig. 2 (below)—Details of tool set-up on second machining operation

can be roughed at only about 40 ft. per min. These forgings are roughed and finished all over in 12 min. for each operation. Fig. 2 shows the tools used in the second operation.

Still another operation on the same piece is shown in Fig. 3. The taper hole has been rough and finish-bored and one end of the piece has been finished on another 24-in. Fay automatic. In this operation, the piece is held by the hole on an expanding air-operated fixture. The tools in front of the carriage rough turn the various steps on the outside diameter while the back arm tool is rough-facing the outer end.

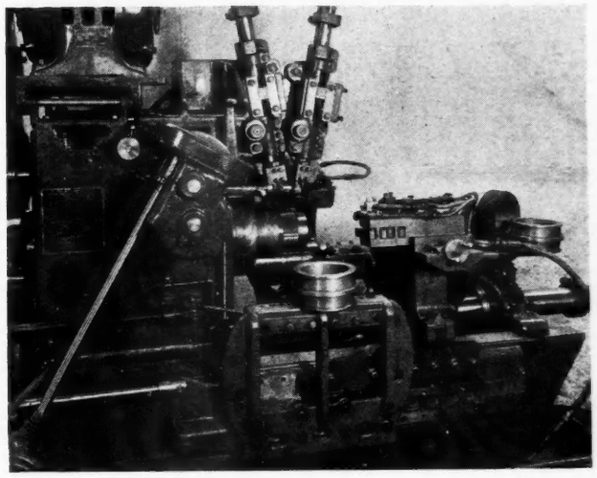


Fig. 3—Another Fay automatic operation where a large number of simultaneous operations are performed in 12 min.

The carriage is then rocked forward so that the three tools shown in the back of the carriage may finish turn each of the three lands on the outside of the piece on the return stroke of the carriage. During this time, the back arm finish forms the two large raceways with the 5-in. circular form tools shown just above the fixture. Also during this period, the tools in the overhead slide face the undercuts on the flanges adjacent to the raceways. Another tool in the back arm also finish-faces the end of the piece during the same operation. Additional tools in the carriage have, in the meantime, roughed and finished the chamfers on the end of the hole and outside of the piece.

Evidently a very large number of tools can be brought into simultaneous use with this machine and operating economies resulting are indicated by the fact that complete machining time for all these operations on ball-bearing steel forgings is again 12 min.

Single-Pedal Brake and Accelerator by Swiss Firm

A POWER brake which is controlled by the accelerator pedal and therefore makes it unnecessary for the operator to shift his foot from the brake pedal to the accelerator pedal and vice versa, has been developed in Switzerland by the Badertscher Superbremse Vakuum A. G. It is operated by the inlet manifold vacuum, but in a somewhat different manner from other vacuum brakes. Normally both ends of the brake cylinder are subjected to the vacuum, so that the same pressure acts on both sides of the piston therein, the brakes then being held in the off position by a retractor spring. When it is desired to apply the brake, atmospheric air is admitted to one end of the cylinder.

When the brake is applied it is not necessary for the engine to first exhaust the air from one end of the cylinder, hence there is no delay in application. The brake is hooked up with the accelerator pedal. In the motion of the accelerator pedal there is a neutral point. When the pedal is depressed below this point the engine is speeded up, while if it is allowed to be retracted back of this point by a retraction spring, the brake is applied.

Several advantages are claimed for this method of brake operation. First of all there is a considerable simplification in the operation of the vehicle, since in normal operation a single pedal controls both the accelerator and the brake. The response of the brake to pressure on the pedal is rapid and yet progressive. It is further claimed that this method of control is in perfect accord with the reflex action in the driver, for in case of danger the natural instinct is to release the accelerator pedal. When the vehicle is stopped on a grade it is not necessary to apply the hand brake. Moreover, in restarting on an up-grade, it is not necessary to first release the brake and then engage the clutch, which does away with the slight reverse movement which usually occurs with the normal type of control in such cases. Also, if the driver should be thrown from his seat or be incapacitated for any reason, the brakes will be instantly applied automatically.

Alongside of the accelerator pedal there is a brake pedal. Operation of the brake by means of the accelerator pedal gives a mild brake action. If it is desired to make an emergency stop the driver presses on the brake pedal, which is also connected to the vacuum brake. It is stated that in 90 per cent of the cases when the brakes have to be applied their operation by means of the accelerator pedal suffices. The brake pedal ordinarily moves up and down with the accelerator pedal. By means of a quite simple device incorporated in the vacuum cylinder, the driver may lock the brakes on all four wheels and thus lock the vehicle and prevent its theft.

The mechanical design of this brake is similar to that of other vacuum brakes. The valve is controlled by means of a linkage. There are pipe connections between the control valve and the inlet manifold on the one hand, and between the control valve and the vacuum cylinder on the other. Finally, the usual brake linkage connects from the vacuum cylinder to the various brakes.

AT the recent meeting of the international committee appointed to organize a competition for container systems for road and rail shipment without repacking, two types of container were provisionally selected. These two containers are to have nominal capacities of 2½ and 4 tons respectively. In principle they will have the following outside dimensions: For the 2½-ton container, 7.38 ft. in length, 6.89 ft. in width and 6.89 ft. in height; for the 4-ton container, 13.77 ft. in length, 6.89 ft. in width and 6.89 ft. in height.

Oil Engines *Limited* to *Heavy Duty By* Building *Costs* and *Weight*

Despite its great fuel economy, the oil type has design disadvantages as compared with its gasoline competitor which restrict its high-speed development.

SOME of the difficulties encountered in the development of high-speed oil engines were discussed by A. E. L. Chorlton in a paper on "The Heavy Oil Engine on Road and Rail," recently presented before the Institution of Automobile Engineers. Comparing the oil engine with the gasoline engine, Mr. Chorlton said the main difference between the two types is due to the much higher maximum pressures in the former. These mean a larger and heavier engine, not in the proportion of the maximum pressures, which may be 2 to 1, but perhaps half of that.

Crankshafts and bearings must be much heavier in the oil engine, and cylinder wall and casting thicknesses must be about 50 per cent greater, but with other parts there is less difference. In order to obtain a compression space of reasonable depth in spite of the high compression ratios, long strokes are generally used, which adds further to the weight. The present-day oil engine does not run as fast as modern gasoline engines, and is not as free from noise as the modern high-powered bus engine, for instance.

Greater crankshaft bearing areas are required, on account of the higher maximum pressures. The crown of the piston must be made thicker, on account of the higher maximum pressure and requirements of heat transmission. The pistons must be made longer because more rings must be fitted and the piston pin is larger in diameter. Connecting rods must be made with a larger shank section and also with larger ends, on account of the higher maximum pressure.

Heavier Crankshaft Necessary

The crankcase must be made heavier throughout, both on account of the higher gaseous pressures and because of the stresses due to the dynamic loads imposed by the heavier moving parts. Cylinder heads also must be made heavier, to make them more rigid and thus make it possible to maintain the head joint tight. Usually the increase in weight is only slight, as the valve-in-head construction naturally insures a rigid structure.

Cylinder liners need be little if any heavier, as the main pressure loading is taken at the extreme upper end, the gas pressure dropping rapidly as the piston proceeds on its down stroke. The main bearings also must be made heavier, and the caps must be stiff, to insure rigidity of journal support, so that the maximum efficiency may be obtained from the area.

There is a small increase in the weight of accessories, as the fuel pump and its auxiliaries weigh more than the magneto, but this may disappear in the future. With a large number of cylinders the flywheel mass required is somewhat reduced, but considerations of starting make a heavy flywheel advisable.

Owing to these various limitations, it is only by using the highest class of materials and giving attention to all details that a really competitive design can be evolved. This, however, will increase the costs of design and manufacture. These restrictions will at first confine the oil engine, in spite of its high fuel economy, to heavy trucks, tractors and railcars. In fact, up to the present the railways, which use larger powers as a rule, have had much more experience with oil engines than any other class of users.

Standard radiators are normally used, but experience has shown it to be advantageous to operate at higher temperatures. Good results have been obtained in experimental work at 260 deg. F., and there will be a tendency to go to steam cooling, which reduces radiating surface requirements from 25 to 30 per cent and keeps the combustion chamber and cylinder at a uniformly high temperature.

Royal Automobile Club Makes Test

Recently the Royal Automobile Club made an official test of a Mercedes Benz truck fitted with an oil engine, and issued a report thereon. The truck weighed 11,928 lb. and carried a load of 14,084 lb., making the total weight equal to a little over 26,000 lb., or 13 tons. The total distance run was 691¾ miles, and the average speed, exclusive of stops, was 17.7 m.p.h. Gas oil was used as fuel, and the consumption was at the rate of 13.48 miles per Imperial gal., which is equal to 11.23 miles per U. S. gal. Thus the fuel efficiency was 13 x 11.23=146-ton miles per gal. (probably a record in road transport).

Starting was effected by means of an electric starter and electric (hot wire) plugs. The average time of starting from cold was 28 sec., while starting the engine when warm and using the plugs required about 3 sec.

In making a comparison of the fuel costs of gasoline and Diesel engines respectively, Mr. Chorlton gives the following table of fuel prices current in London:

Gasoline No. 1—25 cents p. U.S. gal.
Gasoline No. 3—21.6 cents p. U.S. gal.
Kerosene—12.7 cents p. U.S. gal.
Gas oil—9.3 cents p. U.S. gal.
Diesel oil—(ton lots)—6.4 cents p. U.S. gal.
Fuel oil (70°, ton lots)—5.4 cents p. U.S. gal.

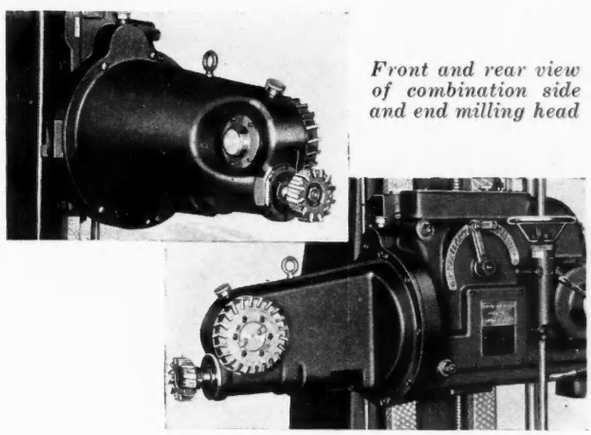
Mr. Chorlton gave a description of the Beardmore engine which is used chiefly for railcar work and which is now being built in eight, six and four-cylinder types. A six-cylinder engine of this type, with a bore of 6½ and a stroke of 9 in., develops 200 hp. at 1250 r.p.m. A governor is provided which regulates the speed at all loads between 600 and 1250 r.p.m., and the governor has a trip which makes it possible to attain a speed of 1400 r.p.m.

New Developments of Interest

G & L Combination Head

GIDDINGS & LEWIS MACHINE TOOL CO., Fond du Lac, Wis., have developed a new combination side and end milling head to be used in connection with their No. 45 and No. 50 high-power precision horizontal boring, drilling and milling machines. The unit is rigidly built with a body of cone shape and heavy section and is complete in itself. The power for driving the cutters is received from the spindle. A spur gear with Morse taper arbor is placed in the spindle and the spindle extended until the gear meshes with the gear on the end of the worm shaft to which the small milling cutter is attached. The large cutter is driven from the small cutter shaft through a hardened and ground alloy steel worm and bronze worm wheel.

All the bearings in the attachment are heavy type combination radial and thrust ball bearings and are packed in grease and completely enclosed. A draw bolt is used for drawing the small milling cutter arbor into the socket. The unit can be easily attached or removed from the machine and is bolted and doweled directly



Front and rear view of combination side and end milling head

to the head of the machine in place of the back cover plate.

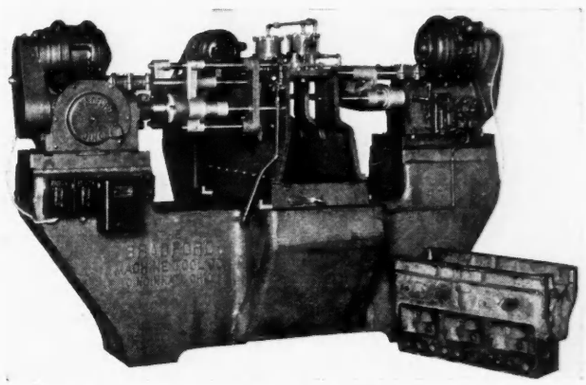
The new milling head can be furnished in two sizes with single or double side mills and a similar attachment can be furnished with the large milling cutter arranged for vertical milling. The 10-in. size carries a 10-in. large cutter and a 5-in. small cutter, with a reach of 27 in. The 12-in. size takes a 12-in. diameter large cutter, a 6-in. small cutter, with a 32-in. reach.

Buick Reaming Machine

IN the cylinder block line of the Buick Motor Co., Flint, Mich., an unusual 3-way reaming machine is being used to ream seven water jacket holes in a total time, including handling, of 30 sec. per block.

The machine used is built by The Bradford Machine Tool Co., Cincinnati, Ohio, and is designed to be used in connection with the shop conveyor system, the conveyor being attached to the front of the machine and level with the bottom of the fixture.

The operator slides the block from the conveyor onto the hardened guide strip on the bottom of the fixture and locates the work in position by dowel holes in the bottom of the flange. The dowel pins are lifted into position or withdrawn by the hand lever shown at the front of the fixture in the accompanying illustration.



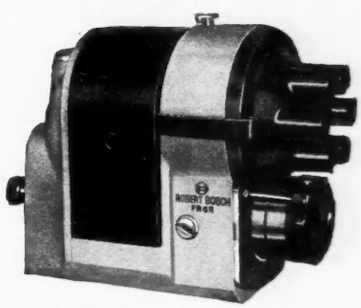
Bradford equipment adapted for reaming water jacket holes in cylinder blocks

The work is clamped by two air actuated rams controlled by the valve shown at the top of the fixture. Feeding mechanism on all three heads is tripped simultaneously from the control valve on the side of the fixture, an air controlled tripping mechanism being shown on the head at the right.

The machine reams seven water jacket holes to 0.943 in. in diameter from cast iron and approximately 1/32 in. of stock is removed on the diameter. The spindle speeds are 350 r.p.m., the machining time is 16 sec. per block and the handling time 14 sec., making a total time of 30 sec. per block.

Robert Bosch Magneto

A NEW magneto for six-cylinder engines has been announced by the Robert Bosch Magneto Co., Inc., Long Island City, N. Y. This new item, known as Type FR6, is designed especially for use on truck, bus, marine, stationary and similar engines, where large cylinder capacity or high compression make an unusually powerful magneto desirable. Type FR6 magneto generates an igniting spark at 30 crankshaft r.p.m. and is recommended for engines operating normally up to 3000 r.p.m., which covers practically the entire range of commercial engines. The new magneto has permanently lubricated ball bearings, gap type distributor, dust-proof and water-proof construction and one-piece aluminum alloy frame, the same as other Robert Bosch super-energy magnetos.



Robert Bosch magneto, Type FR6

First with the News

Reliable. Accurate

News of the Industry

PAGE 744 VOLUME 60 *Philadelphia, Saturday, May 11, 1929* NUMBER 19

Total Production in April Fixed at 633,424 Vehicles

PHILADELPHIA, May 11—Most of the automobile factories have entered the second week of May with maximum production schedules still in force, and indications are that the seasonal recession in the present stupendous output of cars and trucks will not be immediate. While it is admitted that heavy rainfall in some sections of the country has curtailed retail sales to a certain extent, most manufacturers report that the demand in the field, as a whole, continues strong and justifies the maintaining of capacity production. The opinion is not uncommon, however, that there will be a recession in output before the end of this month.

Following the directors meeting of the National Automobile Chamber of Commerce in Detroit, Thursday, it was announced that 633,424 passenger cars and trucks were manufactured in April, setting a new all-time record for the third consecutive month this year. This figure includes all members of the Chamber and the Ford Motor Co. By adding this figure to the 1,544,210 units, announced previously by the Department of Commerce as the output for the first quarter of this year, a total of 2,187,634 cars and trucks, produced in the first four months of 1929, is revealed. This compares with 1,441,589 units produced in the corresponding period last year.

It has been revealed that cars for export have shown appreciable gains, and a close check of the situation tends to prove that a very large proportion of this year's increased output has been shipped overseas. As an example, half of the trucks produced during the month of March were exported and *Automotive Industries* had learned on excellent authority that exports to foreign countries now constitute approximately 20 per cent of the total production of automobiles. A study of the motor car market shows that, while there is a large stock of cars on hand in the field, there is nothing to indicate that this situation has reached alarming proportions.

Stout Picks Canadian Site

DETROIT, May 9—The Stout Metal Airplane Co., which manufactures Ford tri-motor planes, has selected a site at Walkerville, Ontario, for a Canadian plant, according to W. B. Mayo, chief engineer of the company. The Canadian plant will be established as soon as the Canadian market justifies the move.

Schwab and Vavon Arrive to Make Purchases in U.S.

NEW YORK, May 8—Felix A. Schwab, manager, and Paul Vavon, chief engineer, of Societe Anonyme Andre Citroen, arrived in this country yesterday aboard the S.S. Ile de France. M. Schwab stated that the purpose of this visit was to purchase additional machines and tools so that the production of Citroen plants in Europe could be advanced from 500 to 800 vehicles per day. While here M. Schwab and Vavon will study recent developments in the automotive industry in America.

In addition to the main plant in Paris and the existing assembly plants in London, Brussels, Milan and Cologne, this company has just established an assembly plant in Warsaw to take care of the demands of the Polish market. M. Schwab indicated that activity is increasing markedly, particularly in the export market.

Detroit Sales Increase

DETROIT, May 8—Passenger car sales in Wayne County including metropolitan Detroit for the first four months of 1929, was nearly double those of the same period of last year. There were 41,311 cars sold in the county so far this year, compared with 22,357 last year. April passenger car sales total 14,697. Ford sales were 4934.

Edsel Ford Sails for Europe

NEW YORK, May 9—Mr. and Mrs. Edsel B. Ford sailed for Europe on the Aquitania yesterday. Henry Ford was at the dock to see his son and daughter-in-law off.

Car Industry Leads in Rate for Labor

WASHINGTON, May 9—The average entrance wage rate for common laborers in the automobile industry on January 1, 1929, was 55.9 cents per hour, the highest rate paid for labor of this type by 13 industries recently canvassed by the Department of Labor. The labor rate paid by the automobile industry was 10.9 cents per hour higher than the average of 45 cents paid by the 13 industries submitting reports, according to the Bureau's figures.

G.M. Reelects Officers; Opel Chosen a Director

NEW YORK, May 9—Directors of the General Motors Corp., meeting this afternoon, declared the regular quarterly dividend of 75 cents a share and an extra dividend of 30 cents a share on common together with the regular quarterly on senior securities. The dividends on common are payable June 12 and July 2, respectively, to stockholders of record May 18, while the dividend on senior securities is payable Aug. 1 to holders of record July 8.

The retiring officers of the corporation were reelected with the following changes and additions:

Donaldson Brown was elected chairman of the finance committee. John J. Raskob and T. S. Mott were elected members of the same committee.

W. S. Knudsen and John Thomas Smith were elected to the executive committee.

Albert Bradley, A. R. Glancy, R. H. Grant, O. E. Hunt, I. J. Reuter, and T. W. Wilson were elected vice-presidents and will be transferred from their divisional duties to the general staff of the corporation.

At the annual stockholders meeting at Wilmington, Del., yesterday, Dr. Fritz von Opel, chief engineer of the Adam Opel Works, Russelsheim, Germany, was elected a director, following decision of the stockholders to increase the board from 32 to 33 members.

Two Parts Concerns Considering Merger

Wilcox-Rich and Borg-Warner Reported Negotiating for Stock Exchange

DETROIT, May 8—Negotiations are under way for a merger of the Wilcox-Rich Corp. of Detroit, with the Borg-Warner Corp., Chicago, according to information from reliable sources. The negotiations, which have been under consideration several days, have been responsible for activity in Wilcox-Rich stock which rose from $45 a share a week ago to $60 a share in a few days. The stock, still active, is quoted at approximately $58. It is understood in financial circles that if the transaction is completed it will be on a stock trading basis with two shares of Wilcox-Rich being traded for one share of Borg-Warner, which is now selling for approximately $140 a share.

The Borg-Warner group was started about a year ago through the grouping of several well-known parts companies and since that time Borg-Warner has added other influential parts makers until today its operations are very diversified.

The Wilcox-Rich Corp. was incorporated under Michigan laws, Oct. 1, 1928, to effect a consolidation of the Wilcox Products Corp. and the Rich Products Corp. The corporation is one of the largest manufacturers of automotive valves and tappets in the industry and it has also worked up a large piston ring business.

Ruxton Expects to Make First Deliveries in July

NEW YORK, May 9—A. M. Andrews, president of the recently formed New Era Motors, Inc., announced this week that work is progressing on the new Ruxton front wheel drive car rapidly enough for the company to hope that by July 1, when delivery is scheduled to begin, there would be 500 cars on hand.

An organization meeting of the company will be held next week, according to Mr. Andrews, after which officers and personnel of the company will be announced. Location of the plant where the car is to be assembled was not disclosed, but it was stated by Mr. Andrews that manufacture of component parts would take place in three plants, the bodies to be made by the Edward G. Budd Mfg. Co.

J. G. Brill Co. Organizes Research and Sales Unit

PHILADELPHIA, May 7—The J. G. Brill Co. of Philadelphia, manufacturer of electric railway cars and trucks, self-propelled gas-electric and mechanical-driven rail cars for steam railroads, and Brill Steel Diners, recently has organized a new division of the company known as "The Associated Products Division," under the management of J. C. Robb, with F. O. Paul, formerly automotive service manager, as assistant to the division manager.

The new division will control the Departments of Research and Sales Extension, and also control the manufacture and distribution of new products.

New Kinner Stock Plan to Receive Vote May 27

LOS ANGELES, May 7—Directors of the Kinner Airplane & Motor Corp. have voted to offer stockholders the privilege of subscribing to two and one-half additional shares of the capital stock, at $1 a share, for each share held. The plan proposes also to ask each individual stockholder to relinquish his right to purchase the one-half share out of each two and one-half additional shares offered.

A special meeting of the stockholders has been called for May 27 to act on the proposal, which has been submitted to the Los Angeles curb exchange and has been approved by the committee on stock listings. Should this financing plan carry the approval of the stockholders the Kinner company will have a total authorized capital of $2,100,000. There are at present 417,00ᵥ shares of $1 par value outstanding.

Jack Firms Merging

RACINE, WIS., May 9—The contract covering the merger of the Walker Mfg. Co. and the Ajax Auto Parts Co., both of Racine, has been signed and details of the consolidation are being worked out, according the W. T. Walker, president of the first named company. Both companies, which manufacture automobile, truck and garage jacks, will continue to be operated separately, each selling its own brands.

No personnel changes have been announced.

Merger Rumor Explained

NEW YORK, May 8—It is reported on good authority that negotiations have begun for the merger of the Raybestos Co., Bridgeport, Conn., with the United States Asbestos Co., Philadelphia, and the Manhattan Rubber Co. The report of the probable capitalization of the consolidation at $25,000,000 was termed premature by the officials of the several companies involved.

Oakland Offers Prizes

DETROIT, May 9—The Oakland Motor Car Co. is offering $1,247 in prizes for suggestions and plans to aid in the elimination of factory waste. Prizes will be given for the three best essays and three prizes for the best slogans.

Auburn Split-Up Denied

DETROIT, May 8—An official of the Auburn Automobile Co. today denied any knowlege of a stock split-up in the company, as reported in Detroit newspapers this week.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES.

NEW YORK, May 9—The gains in trade in the first quarter of the year were partly lost during April, as a result of the unseasonable weather in that month. It has been either too wet or too cold. The planting of corn and oats has been delayed, and in the South considerable replanting of cotton has been necessitated. Naturally, trade in seasonable commodities has suffered, while business in general has been affected more in the rural districts than in the cities.

FREIGHT CAR LOADINGS

Railway freight loadings for the week ended April 20 totaled 1,004,156 cars, which marks an increase of 32,426 cars over those in the preceding week and an increase of 58,867 cars over those in the corresponding week last year. The total for the week ended April 20 marks a new high record for this year.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended May 4 stood at 96.7, which is the same as that for the preceding week.

BANK DEBITS

Bank debits to individual accounts outside of New York City for the week ended May 1 were 5 per cent below those for the similar week last year.

FEDERAL RESERVE STATEMENT

The most significant feature of the credit situation last week was a substantial easing of credit. The consolidated statement of the Federal Reserve banks for the week ended May 1 showed increases of $11,300,000 in holdings of discounted bills, of $29,200,000 in holdings of bills bought in the open market, of $900,000 in holdings of Government securities, and of $45,600,000 in member bank reserve deposits.

STOCK MARKET

Activity on the stock market last week reflected the easing of credit. By the end of the week call money had fallen to 10 per cent., as compared with the 16 per cent rate at the end of the preceding week, and brokers' loans in New York City increased $40,000,000.

RESERVE RATIO

The expansion of credit made some impression on the Reserve ratio, which on May 1 stood at 73.3 per cent, as against 74.3 per cent a week earlier.

Bank Merger Completed

NEW YORK, May 9—The merger of the Guaranty Trust Co. of New York and National Bank of Commerce in New York was officially completed this week when the combined institution opened its doors under the name of the Guaranty Trust Co. of New York.

Construction Begun by Berliner-Joyce

Baltimore Plant, Costing $250,000, to be Ready in June

BALTIMORE, May 9 — The new $250,000 plant of the Berliner-Joyce Aircraft Corp., now under construction, will be ready for occupancy early in June and will enter production of military and commercial airplanes immediately thereafter, it is announced. The site of the factory, five and one-half acres in area, is adjacent to that of the municipal airport, to be established at a cost of about $4,000,000. The Berliner-Joyce plant will contain 54,000 sq. ft. of floor space, and will include all the necessary manufacturing units.

More than 10,000 persons were present at the cornerstone laying last week. Many prominent men, including Rear Admiral William A. Moffet, chief of the Bureau of Aeronautics; Governor Albert C. Ritchie and Mayor William F. Broening spoke.

The executive staff of the corporation is composed of W. W. Moss, formerly vice-president and controller of the Curtiss company, president; Henry Berliner, president of the absorbed Berliner Aircraft Co., vice-president in charge of manufacturing; T. N. Joyce, formerly test pilot of U. S. Navy, Washington representative of the Curtiss company and sales manager of the Chance-Vought Corp., vice-president in charge of sales; D. H. Maury, Jr., secretary; T. E. Pell, former factory superintendent of the Naval Aircraft Factory, Philadelphia, factory superintendent, and G. R. Coates, sales manager.

The engineering staff is composed of F. S. Hubbard, formerly executive head of the Curtiss technical department, chief engineer; William Wait, Jr., design engineer on Pulitzer trophy and Schneider cup winners, chief of design; W. H. Miller, former chief of Curtiss research laboratory, chief of research; E. P. Osborn, former head of Curtiss structural section, chief of structures, and H. A. Backus, chief of materials.

Foreman Adding to Factory

CHICAGO, May 9—W. D. Foreman, manufacturer of axle shafts and piston pins, has begun construction of an addition to its factory in this city which will provide for 50 per cent additional capacity for the production of axle shafts. On April 1, the company traded its piston pin factory with the Arrow Head Steel Products Co., of Minneapolis, for the latter's axle shaft factory.

Tractor Firm Issues Stock

NEW YORK, May 7—The Cleveland Tractor Co. is floating an additional 96,000 shares of no par common stock at $32 a share. On completion of this new financing the company will have outstanding 220,000 shares of its total authorized 350,000 shares. The company has no bonds or preferred stock outstanding. The proceeds from the sale of these shares will be used to retire existing bank and other indebtedness and supply the company with additional working capital.

Loomis Describes Scope of Truck Transportation

NEW YORK, May 7—Speaking before the Newark (N. J.) Traffic Club last night, Edward F. Loomis, secretary of the Motor Truck Committee of the National Automobile Chamber of Commerce, described the scope of the motor truck as compared with the railroad. The truck is not a competitor of the railroad but rather an ally, having its major field of usefulness in the short hauls made under 30 miles and for less than carload lots, Mr. Loomis pointed out.

As evidence of this relative situation, Mr. Loomis pointed out the experience of the Jersey Central Railroad, which estimates that it has saved $28,000 in one year by the operation of one five-ton truck between Red Bank and Point Pleasant, a distance of 28 miles.

Recognizing the place of the motor truck in transportation, the railroads as well as truck operators are becoming interested in the question of truck taxation and are becoming seriously concerned with the steady rise in truck taxes throughout the country, according to Mr. Loomis.

Auto-Lite Sees Increase

NEW YORK, May 7—The Electric Auto-Lite Co. will do a larger business during the first six months of this year than in the entire year of 1928, according to C. O. Miniger, president. Profits for the year, he estimates, will be equivalent to $15 a share on outstanding stock. This does not include the company's equities in the newly formed Bendix Aviation Corp.

Willys Postpones Trip

NEW YORK, May 8—John N. Willys, president of the Willys-Overland Co., will sail on the S. S. Berengaria on May 15 on a combined business and pleasure trip to Europe. While abroad he will join his wife and daughter who sailed last week for the presentation of their daughter at the Court of St. James. Mr. Willys originally intended to sail with his family but postponed his sailing in order to attend the annual meeting of the Willys-Overland Co., which is to be held in Toledo on May 14.

Airplane Plant Begun

NEW YORK, May 7—The American Aeronautical Corp. has started the erection of its plant at Manhasset Isle near Port Washington, L. I. The erection of the steel framework was begun yesterday. Work has already been going forward on ramps, platforms, bulkheads and runways.

Automotive Exports Set New High Mark

Total Value of $78,324,879 Exceeds February Figure by $16,795,131

WASHINGTON, May 9—American automotive exports during March established a new high valuation record of $78,324,879, exceeding the previous high mark in February by $16,795,131, or 27 per cent, according to an announcement this week by the Department of Commerce. This figure includes a number of items not included in the table appearing in *Automotive Industries* last week, among which are parts and accessories for motor boats, electrical equipment, spark plugs, certain lighting equipment.

Shipments for the first quarter of this year totaled $187,448,282 and were $58,900,600 greater than exports for the corresponding period of 1928, the figures show.

Exports of passenger cars numbered 51,503 with a valuation of $35,021,773 and truck shipments were at a peak with 24,878 units valued at $13,626,014, during March. The month's car exports exceeded those for March, 1928, by 11,323 units and $6,805,416 in value. Truck shipments gained 3073 in the number of units and $2,474,906 in value over the previous high record established in February, 1929, and 156 per cent greater than those for March, 1928.

Foreign purchasers accounted for 10 per cent of the passenger car output and 35 per cent of the truck output during March, indicating that the export business is keeping pace with new production records in the United States. The average unit value of cars exported was $680 and the average unit value of trucks was $548. Canada was the leading passenger car purchaser, the demand during March exceeding that for February by 100 per cent. Argentina was replaced by Australia as the outstanding market for trucks.

Shipments of parts for assembly reached a new high mark of $16,227,348 during March.

G. M. Williams Returns

NEW YORK, May 8—G. M. Williams, president of Marmon Motor Car Co., returned aboard the Berengaria last week from a six weeks' business trip in Europe, his twenty-sixth voyage abroad. He left New York immediately to return to the company headquarters in Indianapolis. Mr. Williams will observe his fifth anniversary as Marmon president on May 15.

Louisville Sales Rise

LOUISVILLE, KY., May 6—April registrations of new cars in Louisville were 55 per cent larger than in the same month a year ago. For the first four months, the gain is 30 per cent.

Automotive Demand for Steel Continues

Producers Are Having Difficulty in Keeping Supplied With Material

NEW YORK, May 9—There is little indication of any lessening of pressure by automotive consumers on finishing mills' capacity. Non-integrated rollers are put to considerable effort to keep supplied with semi-finished material, and even producers who are self-contained in this respect face a real task some days to keep the supply available from their bar-mills in line with the requirements of their sheet-mills. Despite these difficulties, however, there has been no actual loss in sheet or strip output for the want of semi-finished material.

Congestion in pickling and finishing departments, unavoidable under prevailing conditions, is chiefly responsible for the inability of producers of full-finished automobile sheets to promise deliveries of new orders much before the middle of July. Announcements of plant extensions and mechanical improvements multiply. One Ohio mill is installing modern pack furnaces by which it expects to add 40 per cent or 150,000 tons annually to its body stock output. Capacity for the rolling of sheets up to 66 in. wide has been considerably extended, seven mills of this character having been added in the last few years.

Aside from the hardening of warehouse prices for sheets, which affects chiefly the smaller consumers, no change in prices is to be noted. In the market for cold-finished steel bars, the $2.30 price, which was largely nominal during April because many consumers had $2.20 bars coming to them on first quarter contracts, has become fully operative. While parts makers and others are placing some orders for early third-quarter shipment, buyers generally are more concerned about speeding up shipment of material which they contracted for last month than about anticipating their requirements during the heated term.

Pig Iron—A considerable volume of small lot buying, 50 tons or less, continues by the side of inquiries for more representative tonnages for third-quarter shipment. Some markets enjoy considerably more activity than others. On the whole, prices are well maintained.

Aluminum—According to a German authority, the cost of electric current, one of the most important cost ingredients in the production of aluminum, is the one-twenty-fifth part of the present selling price of the metal in the works of the American producer as compared with one-eighth of the present selling price in German plant. This German authority says that American production costs are the lowest in the whole world. Demand for piston metal continues good. Special aluminum alloys for airplane parts are in growing inquiry. The market remains unchanged.

Copper—Consuming demand seems to be light, but producers hold the market steady at 18 cents delivered Connecticut, and 18⅛ cents, delivered Middle West. The so-called "outside" market is nominal at the same levels.

Tin—A slightly better tone prevails and early this week a fair business in Straits tin was done at 44 cents.

Lead—Storage battery manufacturers are buying in a routine way, the market ruling rather quiet and steady.

Zinc—Efforts are being made to curtail ore production by the shutting down of mines and the introduction of the five-day week in others. Considerably more ore has been produced of late than the current demand for metal justified. The market is unchanged and easy.

Plane Cabin Insulated

WASHINGTON, May 9—Construction of an airplane cabin in which the noise is no greater than that of a railway car in motion was announced this week by the U. S. Bureau of Standards. Materials tested varied from a sheet of wrapping paper to ¼-in. glass plate and included compounded structures made up of alternate layers of different materials. By a proper combination of materials the bureau found that it was possible to obtain a structure which had the same sound insulation as a homogeneous material of three times the weight.

Bohn Aluminum and Brass Introduces Light Alloy to be Used in Aircraft

DETROIT, May 6—A new light alloy known as Bohnalite has been announced by the Bohn Aluminum & Brass Corp. of Detroit. It is said to be 36 per cent lighter than aluminum and 78 per cent lighter than iron, from which it would appear to be a magnesium alloy, although it is not so stated in the report. A large market for the new alloy, which can be used in the form of castings, forgings and extruded parts, is expected in the aircraft field. Four grades of Bohnalite are available, with various physical properties, as shown in the accompanying table.

Forged Bohnalite will show a tensile strength of 36,000 to 50,000 lb. p. sq. in. with an elongation of 12 to 18 per cent, depending on the particular alloy used. Extruded shapes have a tensile strength of 38,000 to 47,000 lb. p. sq. in. with an elongation of 10 per cent to 16 per cent. In commenting on the field for the new alloy, Charles B. Bohn, president of the Bohn organization, said:

"Undoubtedly the aircraft engine offers the greatest opportunity for this newest and lightest alloy. Pistons of metal of this type have been used successfully in a number of engines. Some manufacturers are already using castings made of this type of alloy for crankcases, accessory drive housings, intake manifold and pipes, carburetor bodies, etc. In Germany the use of similar alloys is very common, being used for such automobile parts as wheels, axle covers, driveshaft housings, and a number of parts of a similar nature.

"There are many instances where Bohnalite X can be used to advantage in aircraft construction. Such items as cabin hardware, coat racks, etc., made of this light alloy could be reduced in weight, as could many of the metal parts in the washroom. Parts of the lighting equipment could be made of Bohnalite X to advantage.

"Another application would be to tail-wheel hubs. One concern made a very successful tail wheel which required no tire, out of Bohnalite X. Where pneumatic tires are used, the wheels could be made of Bohnalite X with a great reduction in weight."

	No. 1	No. 2		No. 3		No. 4	
	Sand-cast	Sand-cast	Heat-trtd.	Sand-cast	Heat-trtd.	Sand-cast	Heat-trtd.
Tensile strength	.26000	.23000	27-29000	28000	31-32000	21000	25000
Elongation	8%	1½-2%	3-3½%	7%	8-9%	2½%	6%
Brinell hardness	44	57	63	50	56	45	40
Spec. gravity	1.76	1.84	1.84	1.78	1.78	1.82	1.82

United Alloy Expanding

CANTON, OHIO, May 6—The production capacity for auto body sheets at the Massillon rolling mills of the United Alloy Steel Corp. will be increased to 150,000 tons annually, or nearly 40 per cent before the close of the year, according to officials of the company. The corporation is equipping its entire Massillon sheet rolling mills with new modern pack furnaces at a cost of $250,000.

Show Plans Delayed

DETROIT, May 7—Plans for the third All-American Aircraft show at Detroit, to be held April 5 to 13, 1930, are being withheld for the time being until it is known whether the proposed hangar and exposition buildings planned for the Detroit City airport will be ready to house the show on the above dates.

Jensen to Build Planes

NEW YORK, May 6—Jensen Aircraft & Marine Corp. has been organized in Newark, N. J., for the purpose of manufacturing airplanes, by Martin Jensen, holder of the world's solo flight record and the second to land in the San Francisco-to-Hawaii Dole air race in 1927.

Heywood Starter to Act on Merger

Proposal by Bohn and Group to Receive Vote at Meeting June 5

DETROIT, May 8—Stockholders of the Heywood Starter Corp. will meet June 5 to ratify a proposal of the directors for consolidation with the Simon Airplane Appliance Co. The Simon company is to be formed by Charles B. Bohn in accordance with an agreement for consolidation approved by the Heywood directors, whereby stockholders of both companies will exchange their stock on a share for share basis for stock of the consolidated corporation. The proposed name of the new corporation is the Airplane Equipment Co. The Heywood company manufactures a starter for airplane engines.

A special meeting is the second step in the planned formation of an airplane accessory company by Mr. Bohn, who is president of Bohn Aluminum and Brass Corp., and one of the principal stockholders in Warner Aircraft. This move was preceded by the acquisition of a substantial interest in Warner.

It is understood that among the men to be identified with Mr. Bohn in the new company are William B. Stout and Stanley Knauss, of the Stout Air Services, Inc.; Col. Edward F. Roberts, vice-president in charge of manufacturing of the Packard Motor Car Co., and Simon D. Denuyl, secretary of Bohn Aluminum & Brass.

The Airplane Equipment Co. will have an authorized capitalization of 200,000 shares of no par stock of which 125,000 will be outstanding. Stock of the Heywood corporation and the Simon Airplane Appliance Corp., being formed by Bohn, for the purpose of supplying the consolidated corporation with $600,000 of working capital, will be exchanged share for share for that of the consolidated company.

New G.M. Plant for Poland

NEW YORK, May 9—W. L. Palowski, managing director of General Motors in Poland, who is here attending the managing directors conference of General Motors foreign executives, will present a plan for purchase of a suitable factory site and erection of an assembly plant of much larger capacity than the one now occupied under lease by General Motors in Poland. Not only Chevrolet, but other General Motors units would be assembled in the new plant.

Army Plans Exhibit

BALTIMORE, May 7—A military transportation pageant and exposition, under the auspices of the Army, will be held at the Holabird Quartermaster Depot, Baltimore, June 12-14. The program will include demonstrations of Army vehicles not produced commercially, and of four-wheel-drive trucks, tractors, six-wheel units, chain drives, gas-electric vehicles and tests of every form of brake system. There will be an exhibition of chassis, accessories and maintenance machinery, covering 50,000 sq. ft. Space has been made available to all automotive manufacturers.

Highway Building Rapid in Panama

WASHINGTON, May 9—Highway construction is progressing rapidly in Panama, according to a report received this week by the Department of Commerce. The road between Paja and Chorrera is expected to be completed by the middle of this month and the road between Concepcion and Volcan will be passable by automobiles during the next dry season.

Brown-Lipe Unit Moved to Spicer Toledo Plant

TOLEDO, May 8—The differential equipment making unit of the Brown-Lipe Gear Co., of Syracuse, N. Y., has been moved to the new plant of the Spicer Mfg. Corp., here, indicating that some of the expansion of Brown-Lipe may be combined with new developments of Spicer in the new plant in Toledo.

The size of the Spicer plant here is being doubled and it is understood that preparations are being made for further enlargement. The company has reported earnings for the first quarter as $762,000.

James E. Gillespie

BUFFALO, May 6—James E. Gillespie, 44 years old, assistant to the president of the Stewart Motor Corp., Buffalo, died April 27 of pneumonia. Mr. Gillespie first came to Buffalo in 1919, when he associated himself with the Stewart company, whose district sales manager he was for five years. He resigned to go with the Traffic Motor Truck Co. of St. Louis as branch manager at Des Moines, Iowa. He returned to the Stewart company, and a year ago last December he was promoted to assistant to the president. He is survived by a wife and three children. Burial was in Buffalo.

Tool Exposition Planned

NEW YORK, May 9—The National Machine Tool Builders' Association announces that some 230 companies are listed for participation in its Machine Tool Show, which will be held in Cleveland, Sept. 30 to Oct. 4, inclusive. Concurrent with the exposition will be the sessions of the Machine Tool Congress of 1929. The exposition office is at 225 W. Thirty-fourth St., New York City.

Goodyear of Canada Begins Expansion

Will Double Capacity of Cotton Plant and Erect New Warehouse

TORONTO, May 8—The Goodyear Tire and Rubber Co. of Canada, Ltd., Toronto, has embarked upon a program of expansion which involves the expenditure of upward of $2,000,000. The announcement contains the information that the company will double the capacity of the Goodyear cotton plant at Ste. Hyacinthe, Quebec, the addition to be a structure 140 ft. wide and 408 ft. long, containing three floors and a basement. This building, which is of brick and steel, will be ready for occupancy next December, the machinery being supplied from Great Britain. The aggregate number of spindles will be in excess of 45,000, the present number in use being 22,000.

At Saskatoon, Sask., the Canadian Goodyear is erecting an office and warehouse to facilitate western shipments. The plants at New Toronto and Bowmanville are also being improved.

On a recent day, a new record for shipments was made at the plant at New Toronto, these including a trainload of 17 freight cars containing tires, one-half of which were for export. Production at the New Toronto factory is now averaging 10,800 tires per day.

Deere Reelects Board

MOLINE, ILL., May 7—Stockholders of Deere & Co. reelected the 18 directors at their annual meeting recently, and the board, after declaring regular quarterly dividends of $1.75 on preferred, payable June 1 to holders of record May 15, and $1.50 on common, payable July 1 to holders of record June 15, postponed further business until June 4.

Foote Bros. Expanding

CHICAGO, May 9—The Foote Bros. Gear & Machine Co. has purchased a new factory in this city for the manufacture of flywheel starter gears for all makes and models of American automobiles. The division is to be in charge of J. C. Phelps and also includes the production of timing gears.

Body Plant Sale Postponed

RACINE, WIS., May 8—The public auction sale of the automobile body plant in this city, formerly owned jointly by the Mitchell Motors Co. and the Hupp Motor Car Corp., has been postponed from May 6 until May 10.

Gilmer Shows Increase

PHILADELPHIA, May 9—The L. H. Gilmer Co., maker of endless belts for more than a quarter of a century, has announcedd a 36 per cent business increase for the last year.

Bendix Authorizes Transfer of Stock

Stromberg Also Approves Deal for Formation of Bendix Aviation

CHICAGO, May 8—Formation of the Bendix Aviation Corp. and exchange of the stock of the Bendix Corp. for that of the new organization on a basis of two new shares for one of the old, were approved by present Bendix stockholders at a meeting held here yesterday. Stockholders of the Stromberg Carburetor Corp. of America, meeting in New York yesterday, also voted to exchange their stock for that of the Bendix Aviation Corp. Stromberg stockholders will receive 1 1/5 shares of Bendix Aviation for each share of Stromberg held.

At the meeting here yesterday Bendix stockholders were told by Vincent Bendix, president of the Bendix Corp., that earnings of the company for the current year are expected to run between $9,000,000 and $10,000,000, based on the 2,200,000 shares of common stock presently to be outstanding, per share earnings of between $4 and $4.55 are indicated.

Mr. Bendix announced at the same time that Buick had adopted Bendix brakes for its new Marquette car, and that General Motors will turn over to Bendix Aviation Corp. all brake developments and patent rights on aviation devices and that Electric Auto-Lite would do the same with its aviation developments.

S.A.E. Revises Method of Handling Standards

NEW YORK, May 7—At its last meeting the Council of the S.A.E. decided that hereafter approval of the report of the Standards Committee by the Council will be the final action on any newly adopted standards and recommended practices, as well as on revisions, and that the letter ballot of the membership which heretofore followed approval by the Council be discontinued.

Timken Elects Lothrop

CANTON, OHIO, May 8—Marcus T. Lothrop was elected president of the Timken Roller Bearing Co. to succeed H. H. Timken, who became chairman of the board, at the annual meeting of the company held here Monday. The regular dividend of 75 cents on the common stock of the company was authorized.

Allied Motor Elects Davis

CHICAGO, May 8—Paul H. Davis, head of Paul H. Davis & Co., has been elected a director of Allied Motor Industries, Inc. Mr. Davis has been prominent in the automotive and accessory fields for many years, being a director of the Bendix Corp., the Borg-Warner Corp., Evans Auto Loading, Inc., Pines Winterfront Co., and the Houdaille-Hershey Corp.

Ford April Production Reached 190,388 Units

DETROIT, May 6—The Ford Motor Co. announced today that its April production in U. S. and Canadian plants reached 190,388 cars and trucks. This figure does not include cars made in foreign plants. Production in March was reported as 181,894 and in February, 125,984. Of the 190,388 cars 161,796 were for domestic consumption, 16,995 were built in the River Rouge plant for export, and 11,597 were made by the Ford Motor Co. of Canada. While the Ford Motor Co. did not issue a statement on May output, it is understood that this record production, at the rate of 8100 per day, will continue through the month.

New Plant Rumor Denied

The rumor that the Ford Motor Co. of Canada, Ltd., would build an $8,000,000 factory at Winnipeg, Manitoba, to provide for the shipment of Ford cars to Great Britain and Europe via the new Hudson Bay route, has been denied by Wallace R. Campbell, president and treasurer of Canadian Ford.

Windsor Adds Wheelbase

ST. LOUIS, May 7—C. W. Burst, president of the Windsor Corp., announces that the wheelbase on the Windsor White Prince 6-72 7-passenger sedan has been increased to 137 in. and to 140 in. on the 8-92 7-passenger sedan. The factory personnel has been increased and some of the departments are working a night shift.

Moto Meter Shipments Rise

NEW YORK, May 7—Henry Boynton, head of the aviation division of the Moto Meter Co., has announced that shipments of airplane instruments from the company's Long Island City plant have increased 386 per cent in the first three months of 1929 as compared with the corresponding period of 1928.

Hayes Body Earnings Up

GRAND RAPIDS, Mich., May 8—Hayes Body Corp. reports sales for the first four months of 1929 as $9,600,000, against $4,800,000 in the corresponding period a year ago. April set a record with a volume in excess of $4,000,000.

Pioneer Names Coon

NEW YORK, May 7—L. Bowman Coon, formerly connected with the Sperry Gyroscope Co., has been appointed factory superintendent of the Pioneer Instrument Co. in Brooklyn, N. Y. He was with Sperry in 1918.

Budd Wheel Earns $553,814

PHILADELPHIA, May 8 — Budd Wheel Co. reports net earnings for the current year as $553,814 after all charges. This compares with earnings of $151,609 for the corresponding quarter a year ago.

Soviet Government Awards Tractor Job

Henry Ford Pledges Support to Russian Project; Kahn is Architect

DETROIT, May 8 — With the announcement that Albert Kahn, Detroit architect, designer of the Ford, Packard and Hudson plants, has been engaged by the Soviet Government to design and supervise the erection of a tractor plant in Stalingrad, south Russia, discussion of the project in Russian and foreign newspapers has been brought to a definite head.

The new plant is to cost the equivalent of $4,000,000 and will have a capacity of 40,000 tractors of the Soviet type "International" (15-30 hp.) annually. The Stalingrad buildings will be six or seven in number and the Soviet commission in charge of the project has requested that work be undertaken within a month. It is intended to manufacture 150 tractors before the end of the year, for experimental purposes. The production will be increased gradually, so that the peak production will be reached in 1933. It is expected that maximum production will require about 10,000 employees, 1000 of them special technicians. With this in view the commission will establish a school which will turn out about 100 tractor technicians a year.

Henry Ford has definitely pledged the support of the Ford tractor industries and experience to the new project. In a conversation with Mr. Kahn he said:

"I wish you would tell the Russian Commission that anything we have is theirs—our designs, our work methods, our steel specifications."

Packard Produces 4750

DETROIT, May 9—The Packard Motor Car Co. has announced the production of 4750 cars in April. Approximately the same schedule will be maintained in May, it is announced. The company reports that more than 6000 cars were sold at retail in April and that indications point to a continuation of high sales. Production for March was reported as 4780 cars.

Barnes Sets New Record

BRISTOL, CONN., May 8—The Wallace Barnes Co. of this city announces that shipments of springs in April were the largest in both weight and value in the history of the company, exceeding April, 1928, by 45 per cent.

Aeronautical Group Formed

CHICAGO, May 7—A group of Chicago financiers have announced the organization of the Aeronautical Chamber of Commerce of Illinois for the purpose of making Chicago the undisputed leader in the aviation industry.

Men of the Industry and What They Are Doing

Lint Names Executives of City Auto Stamping

Announcement of the executive staff of the new City Auto Stamping Co., Toledo has been made by Amos Lint, president, who is also head of the City Machine & Tool Co., producer of dies for the automotive industry.

G. E. Whitlock, formerly superintendent of the pressed steel division of Dodge Brothers at Detroit, will be the general manager of the new stamping company, and he will have two of his former associates as assistants. A. M. Nickels will be plant engineer and R. H. Guest, production manager. C. C. Bigelow, formerly with Konopak, Hurst & Dalton, local accounting firm, will be office manager.

Temporary offices of the company have been opened at 824 Security Bank Building. The company will employ about 300 workers at the start. Its plant is to be completed by June 15.

Weaver Leaves Sales Post

Jesse M. Weaver has resigned as general manager of the Keasbey & Mattison Co., Ambler, Pa. His resignation, due to ill health, took effect May 1. Mr. Weaver was president of the Brake Lining Association of America for two years. He was general sales manager for Keasbey & Mattison for five years, during which time its woven brake lining showed a 500 per cent increase in sales.

Jarrard Names DeBow

J. W. DeBow is the new sales supervisor of the Marmon Motor Car Co., having been appointed to the new position a short time ago by Thomas E. Jarrard, Marmon general sales director. Operating directly from the factory, Mr. DeBow works in conjunction with Marmon district representatives in all parts of the country in territorial development work.

Clark and Young Return

W. A. Clark, 3d, and J. H. Young, president and vice-president, respectively, of the Pilot Ray Corp. of America, have just returned to Los Angeles.

Mr. Clark has been in Europe three months and Mr. Young has been touring this country contacting distributors of the automobile driving lamp which the company manufactures.

Irving Receives Medal

The Institution of Automobile Engineers of Great Britain has awarded the Gold Medal of the Institution to Capt. J. S. Irving, in appreciation of his work in connection with the design of the Golden Arrow with which Major Segrave broke the world's speed record. The medal was established in 1922 to be awarded in recognition of technical achievement likely to have particular influence on the advancement of automobile engineering.

Edwin Karlson

Newly appointed general works manager of the Marmon Motor Car Co. Mr. Karlson succeeds R. B. Little, who resigned after several years of association with the company

Campbell Leaves for Home

Upon leaving Capetown, South Africa, recently, upon his failure to break the automobile speed record set by Major Segrave, Captain Malcolm Campbell reiterated his intention of returning next year with a new car capable of 300 m.p.h. He expressed the opinion that Verneuk Pan was the finest track in the world.

Folkerts Flies Own Plane

Clayton Folkerts, who has designed the airplanes for Mono Aircraft, Inc., Moline, has finished nearly 50 hours in the air with a plane of his own which has a length of only 17 ft. overall, and a wing spread of 24 ft. Its engine develops 32 hp.

Dodge Names Cosford

E. J. Cosford, formerly sales manager for all Studebaker activities in the Dominion, has been appointed sales manager of the Truck Division, Dodge Bros. (Canada), Ltd., Walkerville, Ont.

Wallace Assumes Buick Post

George H. Wallace, Chevrolet zone manager at Los Angeles for the past two years, assumes, this week, the position of assistant general sales manager of the Buick Motor Co., at Flint.

Acklin Stamping Names Hansen

E. R. Hansen, formerly with the McCord Radiator & Mfg. Co., has been appointed chief engineer of the Acklin Stamping Co.

Deere Tractor Names Rowland and Humason

L. A. Rowland, superintendent of the John Deere Plow Works at Rock Island for the past ten years, has been promoted to the newly created position of works master for the John Deere Tractor Co. at Waterloo. The Waterloo plant has been enlarged during the past year and has 3000 employees.

Frank M. Humason has been advanced from assistant to the position of superintendent of the Rock Island plant to succeed Rowland, while L. A. Murphy is promoted to succeed Humason. Mr. Rowland has been with the company for 18 years in various capacities, while Mr. Humason has been on the payroll for 27 years.

Stanislaus Joins Husky

Sidney Stanislaus, who for the past several years had charge of the sales and advertising of Milwaukee Motor Products, Inc., of Milwaukee, has resigned to accept the position of general sales manager for the newly reorganized Husky Corp., maker of wrenches, hammers and garage equipment. The company now occupies its new home at Kenosha, Wis., a plant containing some 40,000 sq. ft. of floor space.

Stevenson Succeeds Dickerman

American Car & Foundry Co. has elected Frederick A. Stevenson vice-president to succeed W. C. Dickerman who resigned recently to become head of the American Locomotive Co. Mr. Stevenson was formerly assistant vice-president of the A.C.F. Mr. Dickerman remains a member of the board of directors of the corporation.

A.A.C. Names Bonelli

Capt. Piero Bonelli, who was selected last year as navigator for the airplane Roma in her attempted flight from New York to Rome, has been engaged as pilot and navigator on the fleet of Savoia-Marchettis imported by the American Aeronautical Corp.

Mill Visiting United States

Henry Mill, managing director of the Bancroftian Co., 78 Bishopgate Ave., London, England, distributor of engines and accessories, is in this country making arrangements for lines to distribute in the British Isles. He plans to be in America three weeks.

Double Drive Elects Fuchs

William Fuchs has been elected vice-president and a director of the Double Drive Truck Co., of Benton Harbor, Mich. Other members of the board are: Robert Keck, president and treasurer, and George Seebacher, secretary.

Willys-Overland Earns $2,028,020

Income for First Quarter Compares With $1,647,575 Last Year

TOLEDO, May 6—The Willys-Overland Co. reports profit for the first quarter of 1929, as $2,028,020, as compared with $1,647,575, an increase of $380,444. In both cases the figures are given after interest and depreciation but before Federal taxes. The profit, after all deductions, including Federal taxes and preferred dividends, is 50.3 cents per share for the quarter this year on 3,000,000 shares outstanding, as compared with 44.9 cents per share on 2,526,684 shares outstanding a year before. The increase in capital stock took place in the closing days of December, 1928.

"The results foreshadow a still greater profit opportunity for the ensuing month," said John N. Willys, president, "since the first quarter production did not embody the normal proportion of the higher priced cars manufactured by our company. Thus, in January, 76.24 per cent of our output was on the four-cylinder Whippet. At that time the company had reached only a limited production of the six-cylinder Whippet and had not begun to ship the 70-B Willys-Knight model.

"By February the production and sale of the six-cylinder Whippet and Willys-Knight 70-B models had increased to the point that they represented 42.95 per cent of the total output. In March there was a further increase which brought almost half of the production into the six-cylinder Whippet and 70-B Willys-Knight classes."

The earnings for March more than equaled those for January and February combined, according to Mr. Willys. The new assembly plant at Los Angeles is now running better than normal and will be a considerable revenue producer in the second quarter and thereafter. Company sales for the first quarter set a new record, the total being 94,983, as compared with 76,698 in the corresponding period last year.

New Company is Formed for Implement Merger

CHICAGO, May 4—The merger of the Minneapolis Steel and Machinery Co., the Minneapolis Threshing Machine Co. and the Moline Implement Co. will be effected through the transfer of assets to the Minneapolis Moline Power Implement Co. of Delaware, a new company which will have an authorized capitalization of 100,000 shares of convertible $6.50 cumulative preferred stock and 1,500,000 no par common shares, it was announced here this week.

Minneapolis Steel will receive 320,000 shares, Minneapolis Threshing 240,000 and Moline Implement 120,000 in exchange for assets. For the conversion of the preferred stock, 150,000 shares will be reserved, while 20,000 shares will be sold to bankers and 70,000 shares reserved for options granted to bankers, officers and employees of the company, with the remaining shares unallotted.

Profits of 12 Concerns Aggregate $96,115,000

NEW YORK, May 6—First quarter earnings of the 12 automobile and truck manufacturers thus far reporting total $96,115,000, against $92,647,000 in the first three months of 1928. This relatively poor showing of an increase of only 3.6 per cent in a period when 226 corporations showed a gain of 32.1 per cent may be laid, says the Standard Statistics Co. of New York, to the decrease of 12.2 per cent in first quarter earnings shown by General Motors.

"Had it not been for the 12.2 per cent decline in first quarter net income of General Motors, the largest single corporation in the industrial field from an earnings standpoint, the increase shown would have been larger," states the analysis.

Budd Calls Meeting to Act on Stock Issue

PHILADELPHIA, May 7—The Edward G. Budd Mfg. Co. reports gross profits for the quarter ending March 31, 1929, as $1,210,976. After deducting depreciation and interest charges in the amount of $364,741, there was left an amount of $846,226.

After providing for Federal income tax and all other charges, totaling $105,000, the net amount available for surplus was $741,226. In addition to the profits from operations above noted, there was set aside in the reserve account over $1,000,000 during the first quarter.

The directors have called a special meeting of the stockholders June 12, to act on a proposed issue of 687,568 additional shares of common stock to stockholders of record June 12.

Peerless Reports Profit for Quarter as $23,833

CLEVELAND, May 8—The report issued to stockholders of the Peerless Motor Car Corp. shows a net profit of $23,833 and expresses the belief of the management that profit for the month of April will double that amount.

Since Jan. 1, the report states, Peerless has added 161 new dealers. The company reports having only current models of cars in stock, the year 1928 having been devoted largely to liquidating models which had been carried for several years.

Stutz Offers Stock

INDIANAPOLIS, May 6—The Stutz Motor Car Co. of America, Inc., has offered its stockholders the right to subscribe to new stock at $20 a share in the ratio of one share for each ten shares held. The right accrues to stockholders of record May 8 and expires May 29.

Financial Notes

German Ford Motor Co., following a decision of its stockholders at their last meeting, has increased its share capital by four million marks, to 12 million marks. It was also decided to change the articles of incorporation. The new capital will be issued in 40,000 shares of 100 marks each, at par. The entire capital of the company now consists of 120,000 shares.

United Aircraft and Transportation Corp. shows estimated net earnings for the first quarter of the current year, after all charges, of approximately $1,700,000 which will be equivalent after preferred dividends to $1.10 a share on outstanding stock. Earnings of Pratt & Whitney Co., one of the principal subsidiaries of United, are $1,300,274.

McCord Radiator & Mfg. Co. reports a new record in profits for the first quarter of the current year, amounting to $292,411 after all charges. This is equivalent to 63 per cent above the corresponding quarter last year when earnings were $179,349. Net sales were $3,459,560 as compared with $2,712,876 for the corresponding quarter a year ago.

Curtiss-Robertson Airplane Mfg. Co. has called a meeting of stockholders for July 15 to authorize the recall of outstanding 5000 shares of seven per cent preferred stock at 102, and to increase the authorized common stock to 100,000 from 30,000 shares. The plan calls for the offer to holders of common stock for the right to subscribe to one additional share for each share held.

Whittelsey Mfg. Co. will realize $750,000 profits from its first year of operation in the light airplane production field, in the opinion of President H. Newton Whittelsey. This will be in excess of $3 a share on the 240,000 shares of Class A stock outstanding.

Studebaker Corp. of America, Inc., is offering its employees rights to subscribe to common stock in the corporation at $82 a share, purchasable on a monthly payment plan. A block of 15,000 shares has been set aside for this purpose.

Briggs Mfg. Co. reports net profit after all charges for the quarter ended March 31 of $1,404,567, equivalent to 70 cents a share, on no par common stock. This compares with $697,428, or 34 cents a share, for the first quarter of 1928.

Marlin-Rockwell Corp. and subsidiaries report net profit, after all charges, for the first quarter of the current year of $702,706. This is equivalent to $1.94 a share and compares with $450,616, or $1.26 a share, for the first quarter of 1928.

Spicer Mfg. Corp. and subsidiaries report net profit before Federal taxes for the first quarter of 1929 as $762,558. This compares with $420,268 for the corresponding quarter last year.

Marmon Motor Car Co. has declared its regular quarterly dividend of $1 per share on the outstanding common stock, payable June 1 to stockholders of record May 15.

City Machine & Tool Co. reports earnings for the first quarter as $121,134, equal to 80 cents a share on outstanding common

M. & E. A. Reports on Aircraft Field

Survey of Possibilities Shows 350 Makers Active in This Line

NEW YORK, May 7—Approximately 350 automotive manufacturers, members of the Motor and Equipment Association, are supplying either replacements or original equipment items to the aircraft market, according to a survey of this industry recently conducted by that association.

The object of the survey is to ascertain and point out the sales possibilities in that industry to the automotive equipment industry. Pointing to the number of manufacturers in the industry, together with the various operating companies and flying fields, and commenting on the growth of the industry, the survey indicates that this is an important field for a number of the manufacturers of shop equipment and original equipment and replacement parts.

The survey lists upwards of 100 parts and 100 shop equipment and tool items which are in common demand at flying fields and outlines the work done and parts used in typical repair jobs. Particular attention is paid to the experiences of automotive wholesalers who have already cultivated neighborhood airports and developed considerable business as the result.

Particularly recognizing that this industry requires special services and facilities, the survey indicates a trend similar to that in the early days of the automotive industry. A number of members of the association have established well defined aircraft departments while others are developing this field by the employment of salesmen to cultivate the business. A summary of the principal subjects covered by the survey follows:

1. Growth of the industry; developments in air transportation.
2. Aviation progress in various sections of the country.
3. Distribution policies of aircraft, aircraft engines, parts and accessory manufacturers.
4. The automotive wholesaler in the aircraft industry. Sales possibilities, classes of competition, establishment of aircraft department, cultivation of the market; overhaul and replacement business per plane; experiences of wholesalers developing airport business.
5. Summarizing suggestions to manufacturers and wholesalers.

Oshawa Seeks Plants

WASHINGTON, May 9—City officials and the Chamber of Commerce have joined forces with a view of attracting manufacturers to locate plants in Oshawa, Canada, which now has as its only industry an automobile manufacturing plant, according to a report to the Department of Commerce.

Forty-Six Entries Elected to Qualify for 500-Mile Indianapolis Race, May 30

INDIANAPOLIS, May 18—Forty-six entries—more cars than have been nominated since before the war—are elected to qualify for the International 500-mile race to be held at the Indianapolis Motor Speedway, it was announced here this week.

Late among the entries was an English race car, the Thompson Valve Special, which will be driven by a Frenchman, Jules Moriceau, making the third foreigner to nominate himself for the International classic.

There will be six Duesenbergs of Indianapolis origin, three of them composing a factory entry and the remainder individual entries, including one made by Tommy Milton, only two-time winner of the Indianapolis race, who has not yet named a driver but who indicates that he will not come from his retirement. Milton is preparing a Detroit Special, which Cliff Durant, multi-millionaire patron of the speed sport, will wheel in the coming classic. The list of entries follows:

ENTRANT	CAR	DRIVER
Cliff Bergere	Miller Special	Cliff Bergere
M. A. Yagle	Simplex Special	Ray Keech
Tommy Milton	Detroit Special	Cliff Durant
Louis Chiron	DeLage Special	Louis Chiron
Phil Shafer	Unnamed	Phil Shafer
Leon Duray	Packard Cable Special	Leon Luray
Leon Duray	Packard Cable Special	Unnamed
Leon Duray	Packard Cable Special	Anthony Gulotta
Wm. Albertson	Miller Special	Wm. Albertson
Zeke Meyer	Miller Special	Zeke Meyer
Frank Brisko	Burbach Special	Frank Brisko
R. W. Painter and F. Hufnagel	Unnamed	Bill Lindau
Deacon Litz	Miller Special	Deacon Litz
Alden Sampson II	Unnamed	Louis Meyer
Gianfranco Comotti	Talbot Special	Gianfranco Comotti
W. S. White	Unnamed	Babe Stapp
W. S. White	Unnamed	Unnamed
Reed and Mulligan	Unnamed	Albert Karnatz
Chas. Haase	Miller Special	Lou Moore
M. R. Dodds	Unnamed	Bob McDonogh
Alden Sampson II	Unnamed	Unnamed
Cliff Woodbury	Boyle Valve Special	Cliff Woodbury
Cliff Woodbury	Boyle Valve Special	Unnamed
Cliff Woodbury	Boyle Valve Special	Billy Arnold
Thomas Marchese	Marchese Special	Carl Marchese
Chester L. Gardner	Unnamed	Chester L. Gardner
Rickliffe Decker	Miller Special	Rickliffe Decker
C. H. Cunard	Buckeye-Duesenberg	C. H. Cunard
Marion Batten	Miller Special	Unnamed
F. P. Cramer	Miller Special	Unnamed
Thompson Products Co.	Thompson Valve Spl.	Jules Moriceau
Green Engineering Works	Green Special	John Vance
Cooper Engineering Co.	Unnamed	Unnamed
Cooper Engineering Co.	Unnamed	Unnamed
Cooper Engineering Co.	Unnamed	Unnamed
A. S. Duesenberg	Duesenberg Special	Bill Spence
A. S. Duesenberg	Duesenberg Special	Unnamed
A. S. Duesenberg	Duesenberg Special	Unnamed
S. Smith	Ransie Special	Unnamed
Ray Keech	Duesenberg Special	Unnamed
Tommy Milton	Duesenberg Special	Unnamed
Fred A. Schneider	Armacost Special	Unnamed
Ralph Miller	Miller Special	Unnamed
Wm. Yahr	Duesenberg Special	Paul Bost
C. E. Ricketts	Miller Special	Henry Turgeon
Ralph Malamud	Miller Special	Sam Greco

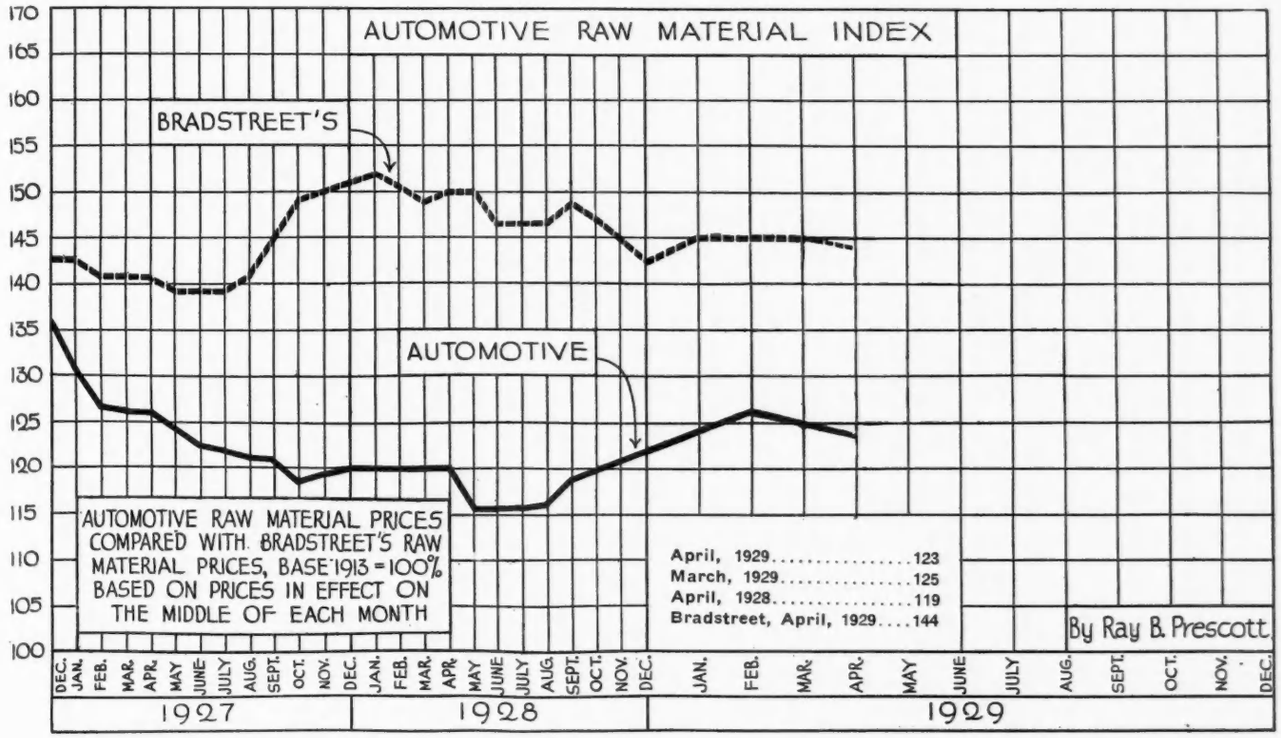
Non-Stop Flight Planned to Include Entire Globe

WASHINGTON, May 9—A non-stop flight around the world will be undertaken by six aviators in a specially constructed airplane next September, it was announced here this week.

Three of the aviators who will make the flight are Lieut. Albert D. Hulse, United States Army reserve; Capt. Harry W. Lyon, navigator of the Southern Cross, and Lieut. T. L. O'Connell, radio operator at Lakehurst. The names of the other flyers have not been made public.

The plane to be used is to be part metal and part linen fabric and will be equipped with five 420 hp. Pratt & Whitney engines, giving the craft a maximum speed of 150 m.p.h. and a cruising speed of 120 m.p.h. The plane will be refueled in flight from 22 stations located along the route.

Raw Material Prices Decrease Two Points



N. S. P. A. Elects Five Manufacturing Members

DETROIT, May 6—Five new manufacturing members of the National Standard Parts Association, recently elected by the Executive Committee are: Ferodo & Asbestos, Inc., P. O. Box 55, New Brunswick, N. J., W. C. Dodge, Jr., vice-president; Mayhew Steel Products, Inc., Shelburne Falls, Mass., J. P. Parsons, vice-president; Maremont Mfg. Co., Chicago, Ill.; H. E. Wolfson, western sales manager; Perfect Circle Co., Hagerstown, Ind.; Lothair Teetor, vice-president in charge of sales; Simonds Saw and Steel Co., Fitchburg, Mass., R. E. Tennyson.

The following changes in name of manufacturers' members were announced: J. A. Drake & Sons, Inc., Reedley, Cal., to Jadson Motor Valve Co., Bell, Cal.; E. M. Smith Co., Los Angeles, Cal., to Emsco Asbestos Co., Downey, Cal.

Formica Making Additions

CINCINNATI, May 7—Formica Insulation Co. is constructing two factory additions with a total floor space of 30,000 sq. ft. The new additions have been made necessary despite the fact that the company expanded its plant six months ago.

Fiat Expanding

PARIS, May 3—Absorbing the Ceirano Automobile Company, of Turin, Italy, Fiat has formed the Fiat-Spa-Ceirano Consortium for the production and sale of trucks, buses and coaches. The Spa factory, which originally produced all types of automobiles, was bought up by Fiat a few years ago. In purchasing Ceirano it appears to be the intention to drop the private car models and make use of the works for truck and coach production.

All the designing and experimental work will be carried out in the main Fiat organization, while production will be entrusted to the Spa and Ceirano works. New models of trucks and buses are known to be in preparation and an active commercial vehicle campaign will begin both on the home and foreign markets.

Ford Fuel Consumption Shown as 637,404 Tons

The 1928 report on fuel consumption and power production of the Ford factories in the Detroit area shows that total fuel consumption at Power House Nos. 1 and 3 was 637,404 tons. This is approximately 12,700 carloads of coal, or a coal train reaching 100 miles.

The steam output of the power houses was 11,853,000,000 pounds, an average of 2,000,000 pounds per hour. The kilowatt hours output at the Rouge plant was 536,944,000 and at the Highland Park and Lincoln plants, 19,347,580, a total of 556,291,580 k.w. hours.

MacClatchie Adding Engine

LOS ANGELES, May 7—The MacClatchie Mfg. Co., of Compton, will manufacture a five-cylinder radial airplane engine in addition to the seven-cylinder type now in production, the Panther. T. C. Alexander, chief engineer, was recently recalled from an eastern demonstration tour to draft plans for the engine.

Hungary Shows Increase in Popularity of Cars

WASHINGTON, May 9—Hungary is still a "horse" country but the automobile is coming into general use, says a report from Budapest received by the Department of Commerce this week. Exports to this country from the United States last year included 714 passenger cars and 82 trucks as compared with 324 cars and 42 trucks the previous year.

The outlook for 1929 is good, says the report, and the demand will be chiefly for light, cheap passenger cars and trucks. There is little demand for expensive cars, since the government restricts the sale of heavy trucks and buses. American cars are popular and meet the peculiar conditions obtaining in the Hungary automotive market, the report states.

William Gamble

MOLINE, ILL., May 6—William Gamble, for 34 years associated with the Moline Plow Co., now the Moline Implement Co., and for the greater part of that time, purchasing agent for the plant, died April 29 in his home here. He retired five years ago.

Institute Meeting May 24

NEW YORK, May 7—American Iron and Steel Institute will hold its 35th general meeting at Hotel Commodore on May 24. There will be the usual sessions morning and afternoon at which technical papers will be read. The meeting will be followed by a banquet in the evening.

New Steel Concern to Prepare Plant

CANTON, OHIO, May 6—Remodeling and re-equipment of the steel casting plant acquired by the International Steel Co. is expected to start within a short time. Approximately $400,000 is to be expended in preparing the plant for operation it was learned this week. The company, capitalized at $5,000,000, was recently formed by a group of steel experts in New York City.

It is expected to begin operation with the employment of approximately 250 skilled men. Eventually 1000 men will be employed according to Alexander Blackwood, Chicago, vice-president and manager.

The distribution fields have been established, and will include automobile, general machinery and railroad equipment builders. Additional sources are now being sought.

Argentina Imports High

WASHINGTON, May 9—Argentina automotive imports remained at a high level during April, says a report received this week by the Department of Commerce from Buenos Aires. The outstanding change noted is the preference for open models and relief in congestion of the second-hand market resulting from distributors sales efforts in country districts, says the report. There is a continued heavy demand for medium capacity trucks in Argentina, the report adds.

Alcohol Fuel Popular

WASHINGTON, May 9—The use of a special automobile fuel mixture containing gasoline and 20 to 35 per cent alcohol is spreading in Germany.

To Compute Value of 1928 Aircraft

WASHINGTON, May 9—The Aeronautics Branch of the Department of Commerce expects to complete its census of aircraft production within the next two weeks, it was announced this week. The purpose of the census is to obtain a figure for the total value of all aircraft manufacturers during 1928.

German Firm Seeks Buyer

WASHINGTON, May 9—A German automobile manufacturer has advised the Department of Commerce of his desire to sell his entire company to an American firm. In making known his desire to sell, the German manufacturer says that an American firm should be able to make use of the factory and its 360 skilled employees and its chain of dealers as a part of its German organization.

Photographs and description of the plant are available upon request to the Automotive Division of the Department of Commerce, it was announced.

A.A.A. Has New Office

NEW YORK, May 6—The Contest Board of the American Automobile Association has announced the resignation of Arthur H. Means as assistant secretary of the board and the establishment of a regional or supervising office for all racing matters in the metropolitan area, of which Mr. Means will be in charge.

Expansion Planned for Farmall Plant

MOLINE, ILL., May 6—Ultimate addition of 2000 to the present staff of 2500 and increase in daily production from 125 tractors to 250, are projected by the International Harvester Co. for its Tri-City Farmall tractor plant, according to E. H. Sohner, general manager. Details of the plan are yet to be worked out.

The expansion will be a slow one, it is indicated, and will be accomplished without creating a sudden demand for labor. Demand for the tractor has exceeded anticipation of the Farmall plant and orders cannot be filled at the present rate of production, according to company officials. A definite move toward the expansion will soon be under way with the removal of railroad track adjacent to the plant to give a clear space, 150 by 800 ft., now divided by one line of rails.

Completion of a foundry and additional machine shops to enable the Farmall to manufacture its own engines as well as the tractor proper will be followed by plan to double this unit when the new production schedule starts.

"Transitone" Introduced

NEW YORK, May 4—"Transitone," a radio outfit for use in an automobile, was formally introduced to the public at a dinner in the grand ballroom of the Commodore here this week. The device is shielded in such a way that no interference with reception is caused by ignition noises common to the automobile. The set is incorporated under the dash and is controlled by two dials set in the instrument panel on the dash of the car. "A" battery current comes directly from the ignition battery.

Calendar of Coming Events

SHOWS

International Aircraft Exhibition, Olympia, London ..... July 16-27
International Aircraft Exhibit, Coliseum, Chicago ..... Sept. 7-15
National Machine Tool Builders' Exposition and Congress, Cleveland, Sept. 30-Oct. 4
Paris, Automobiles ..... Oct. 3-13
London, Automobiles ..... Oct. 17-26
Prague, Automobiles ..... Oct. 23-30
Paris, Motorcycles ..... Oct. 23-Nov. 3
M.&E.A. Show and Convention, Chicago ..... Nov. 4-9
N.S.P.A. Show and Convention, Detroit ..... Nov. 11-16
Berlin Auto Salon ..... Nov. 14
London, Trucks ..... Nov. 7-16
Paris, Trucks ..... Nov. 14-24
London, Motorcycles ..... Nov. 30-Dec. 7
Brussels Auto Salon ..... Dec. 7

CONVENTIONS

National Highway Traffic Association, Hotel Stevens, Chicago ..... May 13-15
A.S.M.E. Meeting, Rochester, N. Y. May 13-16
First Annual Convention of Airport Section, National Aeronautical Chamber of Commerce, Cleveland ..... May 15-16
National Hardware Association (Metal Branch) Annual Meeting, Detroit, May 16-17
American Gear Manufacturers' Association, Annual Meeting, Hotel Statler, Cleveland ..... May 16-18
A.S.M.E. Aeronautic Meeting, St. Louis, May 27-30
Joint Meeting, Oil and Gas Power Division of the American Society of Mechanical Engineers and Pennsylvania State College, State College, Pa. ..... June 24-27
American Society Testing Materials, Annual Meeting, Atlantic City, June 24-28
American Welding Society, Fall Meeting and Exposition, Cleveland .... Sept. 9-12
American Institute of Mining and Metallurgical Engineers, Cleveland, Sept. 9-12
American Society for Steel Treating, Convention and Exposition, Cleveland ..... Sept. 9-13
A.S.M.E.—Iron and Steel Division—National Meeting, Cleveland ... Sept. 11-13
Society for Electrical Development, New York City ..... Sept. 13
Eastern States Exposition, Springfield, Mass. ..... Sept. 15-21
American Electric Railway Association, Atlantic City ..... Sept. 28-Oct. 4
National Machine Tool Builders' Association, Cleveland ..... Sept. 30-Oct. 4
National Safety Congress, Annual, Chicago ..... Sept. 30-Oct. 4
Society of Industrial Engineers, Detroit ..... Oct. 16-18
World Engineering Congress, Tokio, Japan ..... Oct. 29-Nov. 22

RACES

Akron ..... May 12
Gardner Trophy (Aircraft), St. Louis, May 28-30
Indianapolis ..... May 30
Detroit ..... June 9
Altoona, Pa. ..... June 15
Rudge Whitworth Cup, Le Mans, June 15-16
Salem, N. H. ..... June 29
French Grand Prix ..... June 30
Spanish Grand Prix ..... July 31
British Tourist Trophy Race ..... Aug. 17
Akron ..... Aug. 18
National Air Races and Show, Cleveland, Aug. 24-Sept. 2
European Grand Prix, Italy ..... Sept. 8
Syracuse ..... Aug. 31
Altoona, Pa. ..... Sept. 2
Cleveland ..... Sept. 15
Salem, N. H. ..... Oct. 12

S. A. E.

Summer Meeting, Saranac Lake .. June 25-28
Aeronautic Meeting, Cleveland .. Aug. 26-28
Production Meeting, Cleveland ..... Oct. 2-4

Sectional

Cleveland ..... May 13
Detroit ..... " 13
Dayton ..... " 14
Northwest ..... " 18
Indiana ..... " 18
New England ..... " 22
Metropolitan ..... " 23